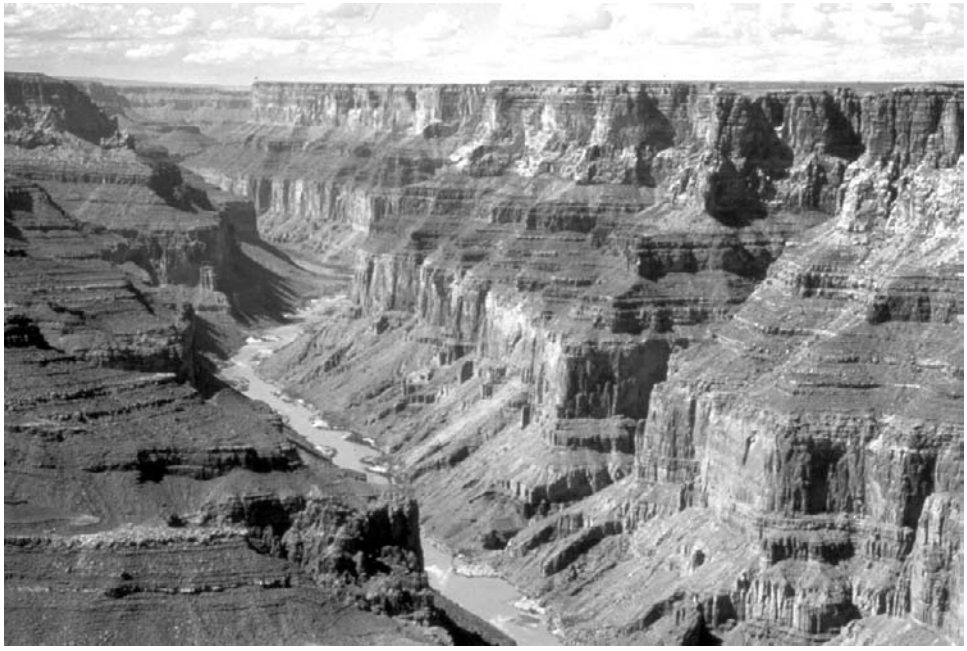
Grand Canyon

National Park Service
U.S. Department of the Interior

Grand Canyon National Park

Environmental Assessment/Assessment of Effect

April 2003



South Rim and North Rim Firing Range Rehabilitation

Grand Canyon National Park • Arizona

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Public Comment
This environmental assessment will be on public review for 30 days. If you wish to comment on the environmental assessment, you may mail comments to the name and address below, no later than _____**.** Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please Address Comments to:
Joseph F. Alston, Superintendent
Attention: Sara White, Compliance Officer
Grand Canyon National Park
P.O. Box 129
1 Village Loop
Grand Canyon, Arizona 86023

United States Department of the Interior • National Park Service •
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INTRODUCTION

The purpose of this document is to disclose the expected effects to the human environment by the proposed rehabilitation of the South Rim and North Rim firing ranges. The human environment is defined as the natural and physical environment and the relationship of people with that environment. This project focuses on the rehabilitation of two firing ranges located on lands administered by the Grand Canyon National Park, in Coconino County, Arizona. One is situated on the North Rim and the other on the South Rim. Construction activity will be confined to previously disturbed areas within each range: approximately 1.0 acres on the South Rim range, and 0.5 acres on the North Rim range. For further reference, see the project vicinity map on the next page (Figure 1 below) and the project location maps on pages 4 and 5 (Figures 2 and 3).

This project has three basic components:

1) Lead reduction in the areas of highest lead concentration at both ranges
2) Construction of a bullet-collection system at each range
3) Rehabilitation of existing facilities at each range.

PURPOSE OF AND NEED FOR ACTION

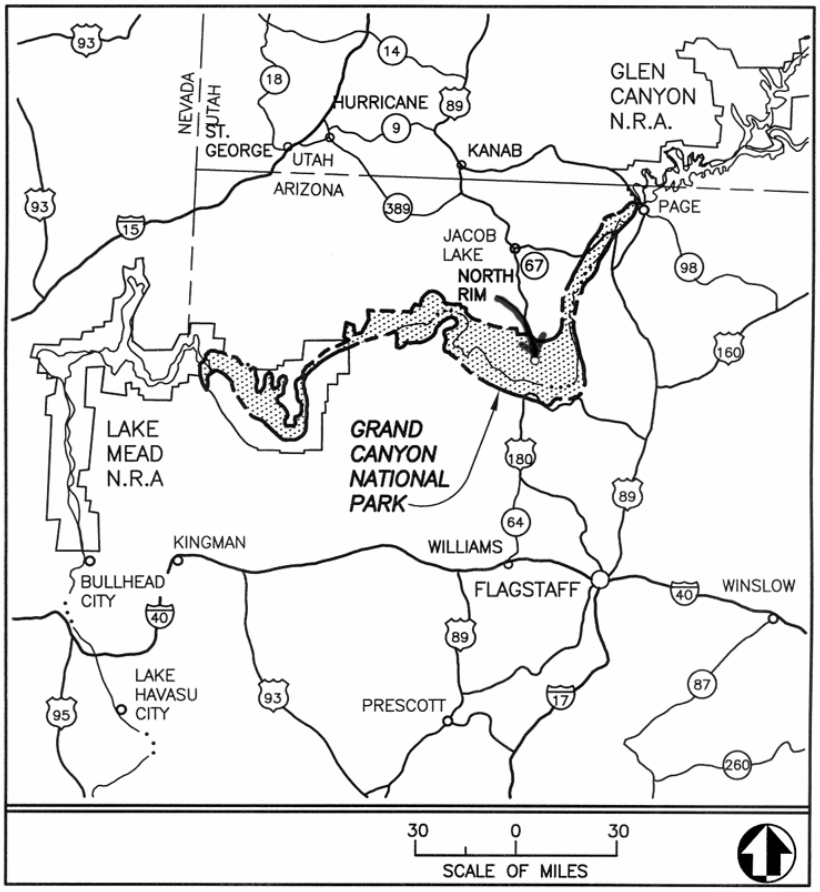
Purpose

The purpose of this project is to reduce the current levels of lead that have been deposited in the soil at the two firing ranges, to prevent further lead deposits from accumulating with the installation of a bullet-collection system at each range, and to upgrade and improve range facilities. Even though this project is not mentioned specifically in the General Management Plan (GMP 1995), it is compatible with the Park Purpose: "Grand Canyon National Park is to be managed to preserve and protect its natural and cultural resources and ecological processes, as well as its scenic, aesthetic, and scientific values" (p.1). This proposal is needed in order to address the following management concerns:

- Lead is accumulating in the earthen backstops used at both ranges. The North and South Rim Firing ranges have been in operation at the Grand Canyon for at least thirty years. Both ranges are used year-round, and it is estimated that at least 30,000 rounds are being fired each year at the park (Berkowitz, NPS, personal com. 12/02). Although lead cleanup is not a legal requirement for the National Park Service until a range ceases to operate, addressing the cleanup of lead now would be environmentally proactive and would likely be less costly to the park in the long run. Firing ranges have also been identified as a potential risk site to the federally listed California condor (California Condor Recovery Team, Jan. 2003).
- There is currently no system in place to prevent further lead deposits from accumulating at the two sites. Installation of a bullet-catching system at each range is necessary to prevent further accumulations and to allow for appropriate lead collection and disposition.

- Rehabilitation of the facilities at the two firing ranges is needed so that facilities meet current standards for firing ranges.

These actions are consistent with the 1995 Grand Canyon General Management Plan (GMP), NPS Management Policies (2001), NPS Director's Orders, and other applicable laws and regulations.



Project Vicinity Map - Figure 1

Objectives

The management concerns expressed above could be resolved by meeting the following objectives:

1. Conducting lead abatement at both firing ranges
2. Installing a system at each range which would prevent further lead accumulation and would also:
    - Accommodate handgun, shotgun, and rifle
    - Minimize maintenance needs
    - Function in all-weather conditions and have durability and long service life
    - Be non-ricocheting and allow recovery of spent bullets for recycling.
3 Improving efficiency and safety of park operations by rehabilitating facilities at each range.

Summary of Environmental Legislation for Lead at Shooting Ranges

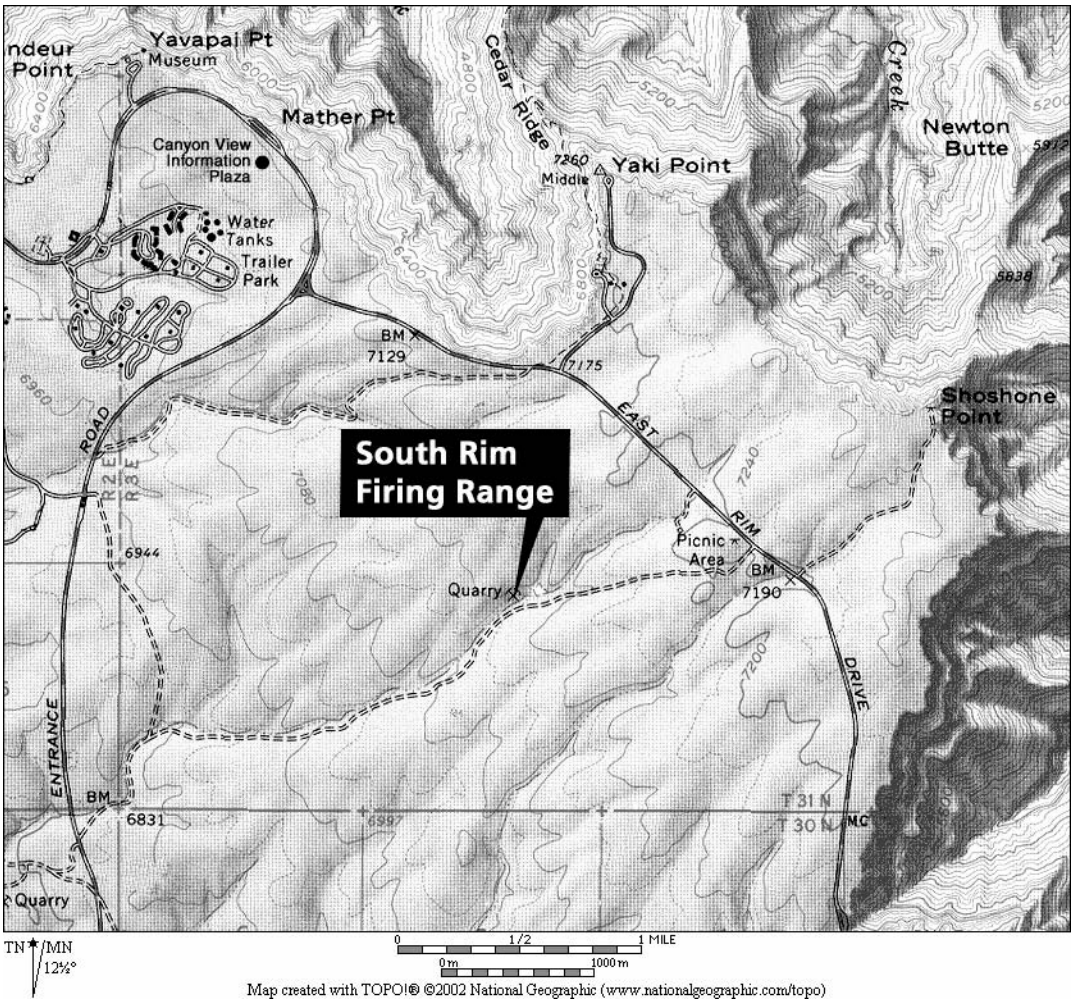
As active small-arms ranges, the Grand Canyon range facilities are not subject to requirements under the Resource Recovery and Conservation Act (RCRA 1976)) or the Military Munitions Rule (Dec. 2000). However, if they were to be shut down, the soil and associated ammunition debris would be subject to the solid/hazardous waste transportation, storage and disposal requirements under the RCRA (40 CFR 260).

Presently the Arizona Department of Environmental Quality (ADEQ) does not regulate active firing ranges, which are subject to regulation only after closure. However, the Hazardous Waste Inspections and Compliance Unit advocates good range practices; i.e., routine sifting and raking, regular collection of lead shot, redesign of ranges to minimize future problems, and reclamation and recycling (McConaghy 2001). The EPA has determined that the act of firing ammunition does not, by itself, generate a solid waste under the Resource Conservation and Recovery Act (RCRA) because the ammunition is being used for its intended purpose. In other words, it has not been "discarded". Lead shot and bullets (excluding gunpowder) are considered scrap metal and are exempt from the RCRA regulatory requirements as long as the lead is recycled. Although lead cleanup is not a legal requirement for the NPS until the ranges cease to operate, addressing the cleanup of lead now would be environmentally proactive and would likely be less costly to the park in the long run. Also, the National Rifle Association's guidelines for firing ranges recommend lead clean up every 1-5 years, even if range use is minimal (2003).

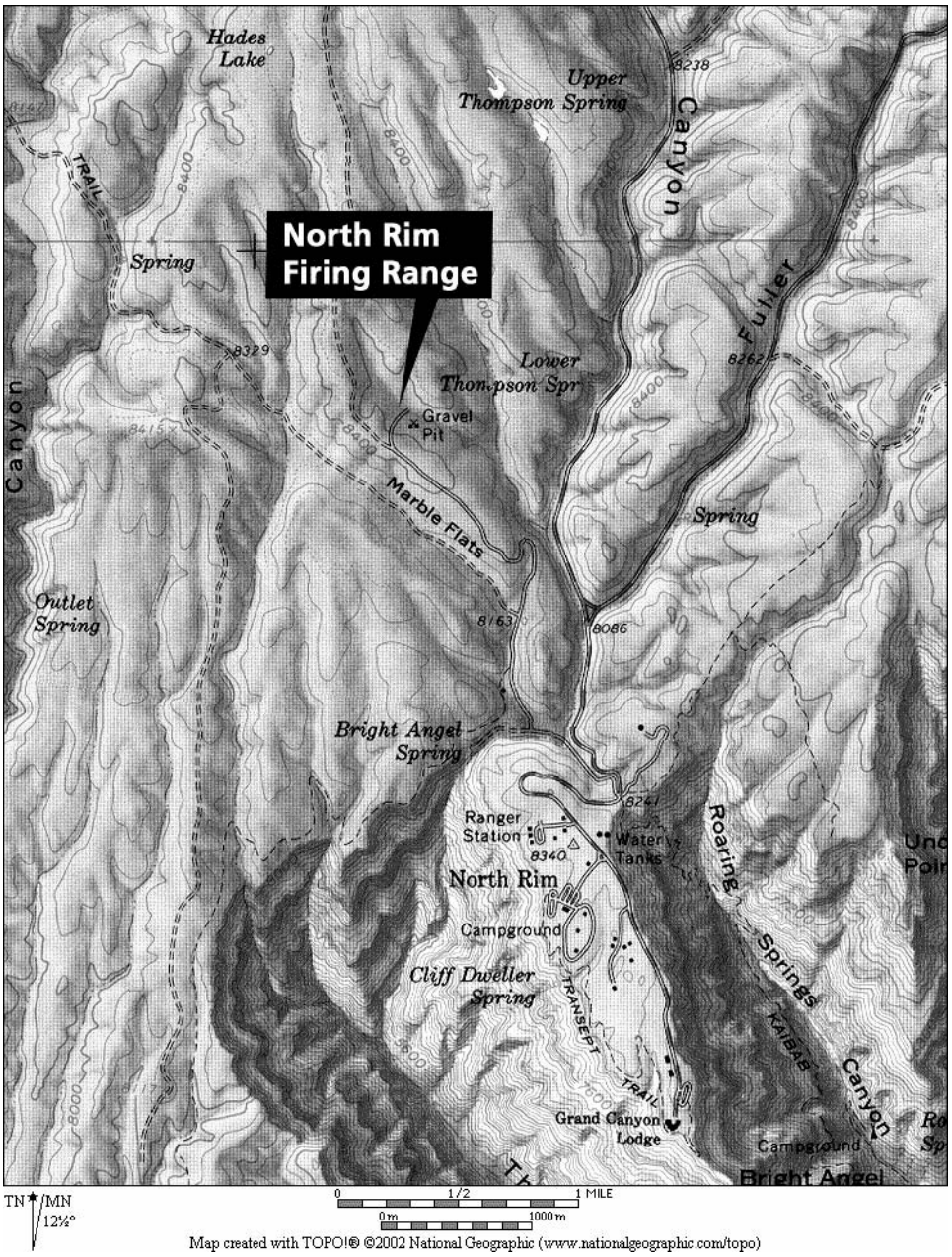
According to Best Management Plan (BMP) guidelines for outdoor shooting ranges, there are several physical factors to be considered in evaluating an operating firing range [AZ Game and Fish Dept. (1999)]. Range size is an important factor, because lead shot is easier to recycle on small ranges and is not dispersed as widely as on a large range. Secondly, topography plays a role, because there is higher lead reclamation on ranges with a flat shotfall zone. Thirdly, ground water is important because the closer it is to the surface, the greater opportunity for leaching of lead into the soil (particularly from shotguns). Vegetation plays a role, because it can absorb rainwater and reduce lead migration. Finally, accessibility needs to be considered for lead reclamation machinery. The operational aspects to be considered include lead volume, the size of the shot or bullets used at the range, the operating schedule, the shooting direction and pattern, and the range life expectancy (AGFD 1999).

A "Phase I" environmental site assessment was prepared by the Army Corp of Engineers for both firing ranges at the park in 2001. The only potential hazardous waste issues identified at either

range were the lead-containing soils associated with the earthen berms used as bullet backstops (Tetra Tech NUS 2002).



Project Location Map for South Rim Firing Range – Figure 2



Project Location Map for North Rim Firing Range – Figure 3

MANAGEMENT AND PLANNING HISTORY

History

National Park Service Management Policies (2001) is the guiding document for management of all national parks within the National Park System. It is the highest of three levels of guidance documents in the NPS Directives System. As stated in the introduction, "It (NPS Directives System) is designed to provide NPS management and staff with clear and continuously updated information on NPS policy and required and/or recommended actions, as well as any other information that will help them manage parks and programs effectively." These management policies set forth direction for each unit of the national park system to maintain an up-to-date General Management Plan. Grand Canyon National Park is currently operating under the direction of the *1995 General Management Plan* (GMP). This plan provides guidance for resource management, visitor use, and general development for a period of 10 to 15 years. The primary purpose of the Plan is to provide a foundation from which to protect park resources while providing for meaningful visitor experiences. The firing ranges are part of development zones, which prescribe these areas to provide and maintain facilities for serving park personnel and visitors.

Background History for GRCA Firing Ranges

Both firing ranges are considered small-arms ranges (which includes the occasional use of shotgun and rifle), and are used exclusively by the Law Enforcement Branch of the National Park Service to practice and qualify commissioned rangers. A variety of caliber handguns are used. Ammunition in use is lead encased in copper and lead shot. Firing ranges were created at both the North Rim and South Rim because it was not practical or effective to have distant off-site practice areas for law enforcement staff. The closest firing range to the South Rim is located in Williams, Arizona – a distance of nearly sixty miles. According to NPS staff, travel would be prohibitive not only because of the travel time, but also because there is an attempt to "rotate" officers in and out of qualifications, thus enabling them to qualify and return directly back to their work assignments. In this way, park staff is never depleted to a level that compromises operations (Berkowitz, personal com. via electronic mail, April 2003). Ranges need to be available for practice and training on a continual basis. At the North Rim, the nearest qualifying range is located in St. George Utah, nearly 150 miles from the park boundaries. The isolation of the North Rim is a significant factor in the need to retain a firing rang at the North Rim, as the cost and time for travel to a professional range would be prohibitive (McCutcheon, personal com., April 2003).

South Rim

The South Rim Firing Range (SRFR) is located within an abandoned rock quarry, approximately 1.2 miles southwest of Desert View Drive (Figure 2). It lies within the Rowe Well Watershed (Spotskey, D. 2000). The quarry is estimated to encompass approximately 4 to 5 acres; however, the range itself occupies an area measuring approximately 280x150 feet within the quarry. Quarry operations may date back to the 1920s or 1930s, when limestone from the quarry was used for road construction within the park. No available documentation or site personnel were identified that could provide a description of the quarrying and/or dumping operations that existed historically around the SRFR. According to park staff, the site has been used exclusively

as a small-arms range since the early 1980s, when dumping of waste in the quarry also ceased. Features associated with this range include eight static firing lanes, a storage container and an abandoned house trailer. Access to the SFSR is limited to authorized personnel, and the range is closed to the public and secured by a locked gate. At the SRFR, bullets fired by law enforcement personnel pass through targets on wooden frames and are stopped by an earthen berm located at the north end of the range (Figure 4).

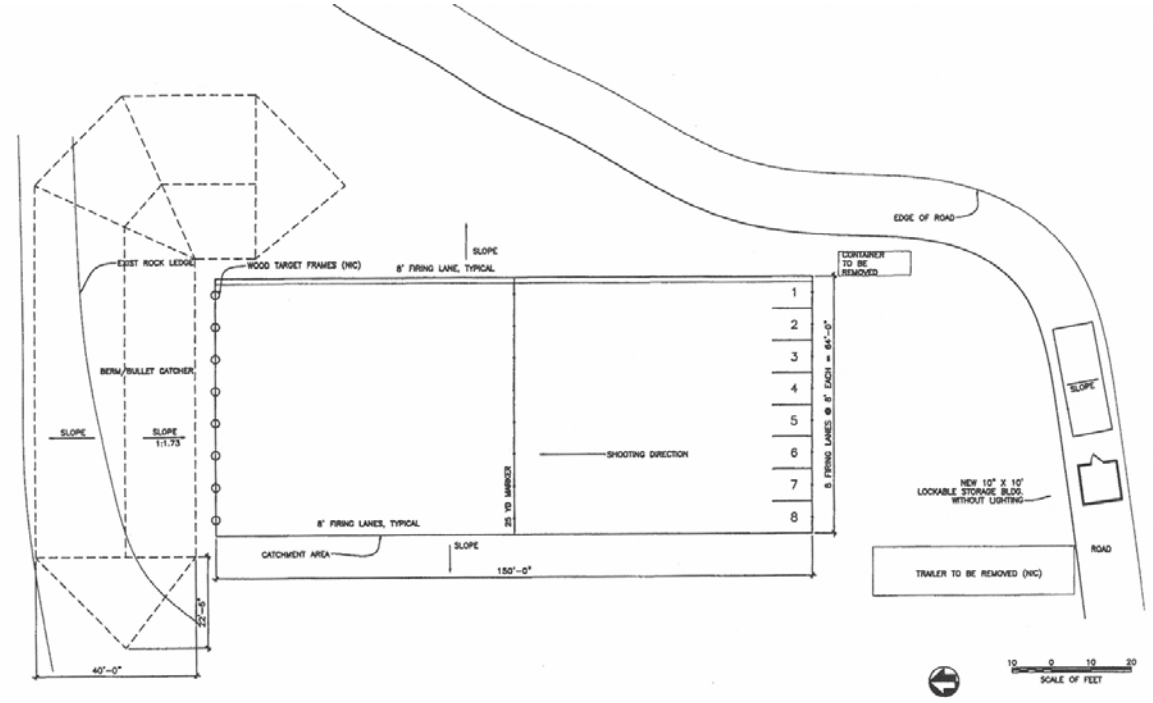


FIGURE 4 - SOUTH RIM FIRING RANGE SCHEMATIC

North Rim

The North Rim Firing Range (NRFR) is located in an abandoned gravel pit on the Kaibab Plateau, within the Bright Angel Watershed (Figure 3). The firing range occupies an area of approximately 200x100 feet within a clearing of trees at the end of a 0.2-mile turnoff from Widforss Road. According to park staff, this range has been in operation since at least 1970. Features associated with this range include five static firing lanes and a small wooden shed. Law enforcement personnel presently fire through targets into earthen berm backstops. The primary backstop was constructed in the mid-1990s with soil excavated from the immediate NRFR area. A second smaller earthen berm located within the range is used occasionally for tactical firing exercises (Figure 5).

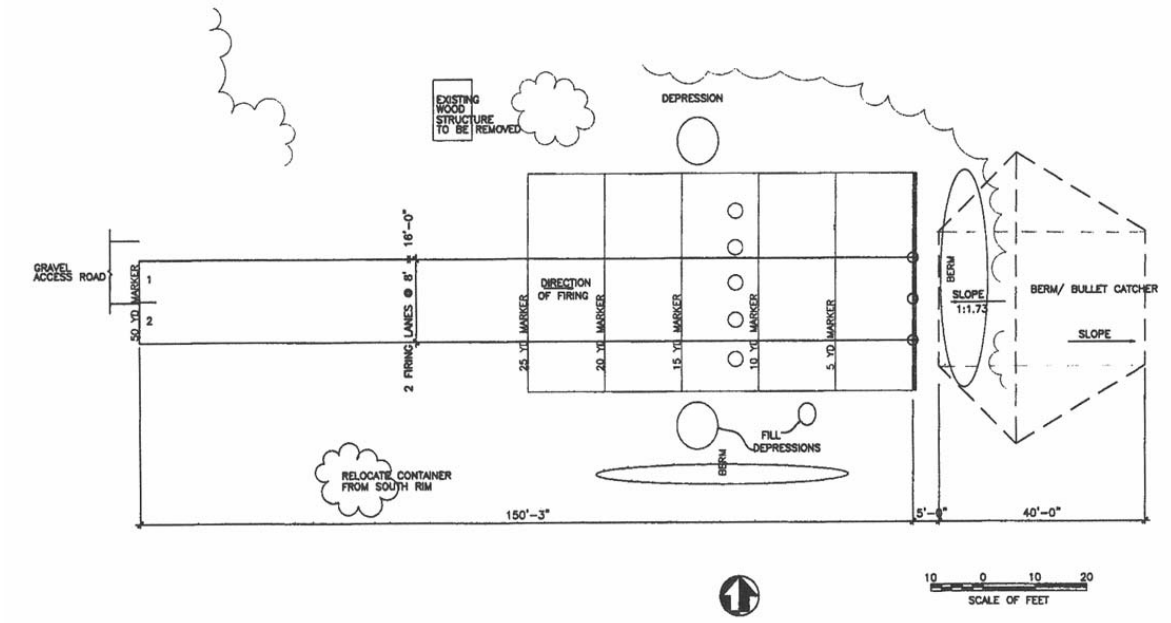


FIGURE 5 - NORTH RIM RANGE SCHEMATIC

Value Analysis

An interdisciplinary team conducted a value analysis on July 6, 2001 to evaluate the merits of several bullet containment systems for this project. The use of value analysis (VA) and the subsequent choosing by advantages protocol when evaluating the merits of large projects is a National Park Service mandate. It is a systematic approach of evaluating alternatives in context with the value of identified issues, concerns, and functions. Of the 13 systems and variations on systems evaluated, three were selected for further evaluation, using a "choosing by advantages" approach. The VA for this project will be discussed further in Chapter 2. This project was also presented at various stages of its development to the GRCA Project Review Board to identify potential issues and concerns of park management and has been reviewed on multiple occasions by the park's standing interdisciplinary team.

Scoping

- The firing range rehabilitation proposal was included in a public scoping letter that was submitted to a 300-person Grand Canyon National Park mailing list on February 20, 2003. The purpose of the scoping letter was to describe the proposed action to any interested/affected parties and solicit comments from those who may have issues with the proposed action. From these public scoping activities, four responses were received. One respondent wanted to know whether it is really necessary to have firing ranges within park boundaries. The EA addresses the historical use and need for firing ranges within the Park, and a copy of the EA will be sent to this respondent. Other responses either offered no specific comment on the proposal and thanked the park for keeping them informed, or were in support of the proposal as described. The Park Service performed a content analysis on this information, information gained from internal scoping, and information gained from

scoping with other agencies. From this effort, the Park Service did not identify any additional significant issues for analysis.

- Consultation between the National Park Service (NPS) and the U.S. Fish and Wildlife Service on this project is complete. Concurrence was received on July 9, 2002. The Park Service met on December 13, 2000 with U.S. Fish and Wildlife Service and Arizona Game and Fish Department personnel to discuss this project proposal and other future proposals. The Fish and Wildlife Service concurred with the park's determination that implementation of the rehabilitation of the firing ranges, as one of 61 construction projects occurring over the next five years, may affect, but is not likely to adversely affect the Mexican spotted owl or the California condor. Concurrence was received on July 9, 2002.

- An informational letter describing this project was sent to the Arizona State Historic Preservation Office in November 2002. Their office requested information regarding tribal consultation and archaeological surveys completed in the project areas. These issues are addressed in the EA, and a copy of the final EA/AEF will be sent to the SHPO.

Discussion of Use of Non-Toxic Ammunition
The park has discussed the possibility of switching to the use of non-toxic, frangible ammunition (also known as "green" ammo) for qualification and practice. This ammunition has been in use at the Federal Law Enforcement Training Center since 2001. According to GRCA law enforcement staff, policies at Grand Canyon National Park specifically require that qualification for law enforcement officers be accomplished with the exact same ammunition that is carried on duty (Berkowitz, personal com. via electronic mail 12/02). While there is no prohibition against shooting non-service ammunition, it does not replicate the functioning and shooting characteristics of service loads. In other words, it cannot serve in place of the standard lead-based loads used by park personnel. The use of alternative ammunition at the ranges at some point in the future would not alter the objectives of the firing range projects. GRCA will continue to explore the applicability of the use of "green" ammunition for practice and qualification in the park. However, continued use of lead ammunition at the firing ranges is anticipated, even if green ammunition is used to some extent for qualifying.

ISSUES AND IMPACT TOPICS

Various agencies have been contacted and consulted as part of this environmental analysis. Appropriate federal, state, and local agencies have been contacted for input and review. (See Chapter 5 for a list of persons contacted.) National Park Service specialists, with input from federal, state, and local agencies, identified issues and concerns (i.e. impact topics) affecting this project. After public scoping, issues and concerns were distilled into distinct impact topics to facilitate the analysis of environmental consequences, which allows for a standardized comparison between alternatives based on the most relevant information.

An issue is an effect on a physical, biological, social, or economic resource. The predicted effects of an activity create the issue. Issues may come from the public, from within an agency or department, or from another agency (Freeman and Jenson 1998). For this project, issues with various proposed alternatives were identified by the interdisciplinary team and were brought

forward by other agencies. No additional issues came forward through public scoping. Once issues were identified, they were used to help formulate alternatives and mitigation measures. Impact topics were then selected for detailed analysis based on substantive issues, environmental statutes, regulations, executive orders, and *NPS Management Policies* (2001). A summary of some of these compliance-related laws and regulations is provided in Appendix A. A summary of the impact topics and the rationale for selection or dismissal are given below.

RELEVANT IMPACT TOPICS

Soils and Water
Proposed activities would result in some ground disturbance and have the potential to impact the soil and water resources. An assessment of the impact of migration of lead and lead compounds in connection with both firing ranges was done by Tetra Tech NUS, Inc. (2002). This topic will be addressed further in Chapter 3.

Special Status Species (Mexican Spotted Owl and California Condor)
NPS staff and FWS staff discussed multiple Park projects during the preparation of the Parkwide Construction Program Batch Biological Assessment (BA) during March – June 2002 (NPS 2002). The North and South Rim Firing Range rehabilitation projects were evaluated in this BA and the potential for effects to federally listed species were determined. The FWS concurred with the park's determination that implementation of the projects listed as part of the Park's construction program may affect, but would not likely adversely affect, the Mexican spotted owl, California condor, bald eagle and sentry milk vetch. As listed in this BA, the only federally listed species with the potential to be impacted by implementation of the South Rim firing range proposal is the California condor and the only species with the potential to be impacted by the North Rim firing range proposal is the California condor and the Mexican spotted owl. As stated previously, the FWS has concurred with these determinations (USFWS letter July 9, 2002). Section 7 of the Endangered Species Act requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. The topic of Mexican spotted owl and California condor will be discussed further in Chapter 3.

Park Operations
This project is designed to improve the operation of the firing ranges in the park. Clean-up of the lead and implementation of a bullet containment system would help provide a facility that meets current environmental standards, and would not require costly and extensive clean-up efforts if and when the ranges are closed at some point in the future. This topic will be discussed further in Chapter 3.

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

General Wildlife Populations/Species of Interest: The North and South Rims are diverse in terms of topography and vegetation and provide habitat for a wide variety of wildlife species.

Mammals typically associated with ponderosa pine and juniper woodland vegetation on the South Rim include species such as elk, mule deer, ground squirrels, Abert's squirrels, deer mice, and several bats. Reptiles include western rattlesnake, short-horned lizard and mountain skink. Mammals typically associated with montane conifer forests on the North Rim include mule deer, bobcats, mountain lions, porcupine, badger, up to 19 species of bats, montane voles, chipmunks, and Kaibab squirrels. Birds include black-throated gray warbler, red-faced warbler, yellow-rumped warbler, gray flycatcher, stellar's jay, pinyon jay, western tanager, pine siskin, pygmy nuthatch, western bluebird, blue grouse, Merriam's turkey, and several species of hawks (red-tailed hawk, Cooper's hawk, sharp-shinned hawk, and northern goshawk). Amphibians and reptiles include tiger salamander, northern leopard frog, western rattlesnake, ringneck snake, and western skink (Brown 1994).

Representatives from the U.S. Fish and Wildlife Service, the Arizona Game and Fish Department, and Grand Canyon National Park met in December 2000 to discuss many upcoming projects within the Park, and also developed "species of interest" lists for the inner canyon, north rim, and south rim to aid in an evaluation of future actions in these areas. Species listed for the south rim that are not already considered special status include mule deer, Merriam's turkey, desert bighorn sheep, mountain lion, Rocky mountain elk and breeding birds. Species listed for the north rim include mule deer, Merriam's turkey, desert bighorn sheep, mountain lion, voles and shrews, and breeding birds.

The potential for impacts to occur to general wildlife populations and species of interest in the vicinity of both the North and South Rim firing ranges are minimized by the fact that substantial vegetation disturbance would not occur at the ranges as a result of this project and that the firing ranges have been in use in these areas for many years. Habitat for wildlife species would not be altered by implementation of any of the alternatives. These ranges are already disturbed sites with very little vegetation and provide low quality habitat for wildlife within the areas of the ranges themselves. No vegetation outside of the boundaries of the existing ranges would be disturbed by this project and changes to wildlife habitat in the surrounding areas of either range are not expected. The potential for impacts to wildlife from project implementation are primarily due to the noise disturbance associated with lead clean-up, construction of a bullet-catching system at each range and the construction of range improvements. Wildlife populations could be disrupted due to the higher than normal noise generated in the immediate vicinity of the ranges during construction activities. These noise impacts, however, would be short-term and local. For these reasons, implementation of any of the alternatives would result in negligible impacts to general wildlife populations and species of interest. Therefore, this topic was dismissed from detailed analysis.

Special Status Wildlife Species. Table 1 lists threatened, endangered, proposed, and species of concern that have the potential to occur in the vicinity of the North and South Rim firing ranges, based on confirmed locations or known habitat preferences. The list in Table 1 was developed from personal knowledge of the area by Park biologists, Park records, the AGFD Heritage Nongame Data Management System database (2000), and Arizona Game and Fish Department and U.S. Fish and Wildlife Service biologists.

Table 1 - North and South Rim Firing Ranges
Special Status Species with potential for occurrence in the project vicinity, based on known occurrences and habitat preferences, Grand Canyon National Park.

Species	*Scientific Name*	Status
Mexican Spotted Owl	*Strix occidentalis lucida*	T, WC
California Condor	*Gymnogyps californicus*	T*, WC
Bald Eagle	*Haliaeetus leucephalus*	T, WC
Peregrine Falcon	*Falco peregrinus anatum*	SC, WC
Northern Goshawk	*Accipiter gentiles apachense*	SC, WC
Spotted Bat	*Euderma maculatum*	SC
Greater Western Mastiff Bat	*Eumops perotis*	WC

Key: *T = federally listed as threatened under the Endangered Species Act (ESA); WC = Wildlife species of special concern in Arizona (AZ Game and Fish Department 10/14/96); SC = former species of concern to the US Fish and Wildlife Service, but for which there is no legal status (all former C2 species Fed Reg. 2/28/96); T* = federally listed as an experimental non-essential population in Arizona, but in National Parks the species is considered federally listed as threatened under ESA. WC[1] = this species is currently under a status review for possible federal listing*

Bald Eagle: Bald eagles occur in Arizona as either breeding populations or winter migrants. Nests occur in tall trees, cliff faces, ledges, and pinnacles near open water for foraging. Perches for shelter, roosting, foraging and guarding are important habitat components. Their diet is comprised mainly of fish, with small mammals, carrion, birds and reptiles eaten to a lesser extent (AGFD 1997). Nesting occurs along central Arizona rivers including the Salt River and Verde Rivers. New nest sites along the Gila, Bill Williams, Agua Fria, and San Pedro drainages indicate that the Arizona population is increasing. Since 1992, nearly 250 winter bald eagles have been observed each year in Arizona, with most occurring close to water in coniferous forests near Flagstaff and the White Mountains (AGFD 1996). Bald eagle nesting does not occur within Grand Canyon National Park, but wintering eagles are often seen within park boundaries. Three sites have been identified as winter roost areas in the park, including a site near Twin Overlooks, along Desert View Drive on the South Rim, approximately 1 mile north of the South Rim firing range. Due to the fact that these firing ranges are already in use and have been for many years, that vegetation disturbance would be minimal for the proposed projects and that winter roosting and foraging habitat for bald eagles would not be impacted by the proposed projects, impacts to bald eagles would be negligible. Short-term impacts as a result of noise disturbance from construction activities have the potential to occur, but would also be negligible due to the fact that the nearest confirmed winter roost is over 1 mile from the South Rim range. Therefore, impacts to bald eagles are expected to be negligible from implementation of any of the alternatives.

A detailed analysis of the expected effects of this project on Threatened and Endangered species is the subject of a separate Biological Assessment (NPS 2002). The potential for adverse impacts to federally listed species has been consulted on with the U.S. Fish and Wildlife Service (USFWS), as a part of a batch consultation effort that evaluated 61 construction projects in the park over the next five years. Mexican spotted owl, California condor, bald eagle, and peregrine

falcon were included in this analysis and concurrence from FWS was received (USFWS letter July 9, 2002). For these reasons, this species was dismissed from further detailed analysis.

Peregrine Falcon: Peregrine falcons are known to occur throughout the Park, with multiple locations along the river corridor and the rims. There is one peregrine eyrie approximately 1.5 miles north of the South Rim firing range, along the canyon rim. At the North Rim, another eyrie is located approximately 4 miles south of the project area. Due to the fact these firing ranges are already in use and have been for many years, that vegetation disturbance would be minimal for the proposed projects and that nesting, roosting and foraging habitat for peregrines would not be impacted by the proposed projects, impacts to peregrines would be negligible. Short-term impacts as a result of noise disturbance from construction activities have the potential to occur, but would also be negligible due to the fact that the nearest peregrine eyries are at least 1.5 miles from either range. Long-term impacts associated with construction equipment removing spent bullets from the bullet-catching system for periodic maintenance could also occur; however, these impacts should also be minimal for the reasons stated above. Therefore, impacts to peregrine falcons are expected to be negligible to minimal from implementation of any of the alternatives. For this reason, this species was dismissed from detailed analysis.

Northern Goshawk: Northern goshawks generally nest in stands of mature trees with a dense canopy. They are forest generalists and use a variety of forest ages and types to meet their life history requirements (Reynolds et al. 1992, 63 FR 35183-35184). Goshawks prey opportunistically on a variety of small to mid-sized mammalian and avian species such as squirrels (Sciuridae), blue grouse (*Dendragapus obscurus*), rabbits, woodrats, doves (*Zenaida* spp.), jays (*Cyanocitta* spp.), and woodpeckers (*Picoides* spp.). Foraging habitat is probably as closely related to prey availability as to habitat structure or composition. Goshawk surveys have been conducted in Grand Canyon National Park. South Rim surveys were conducted regularly in 1991, 1992, and 1994-1996. Sporadic surveys also took place in 1999 and 2000, and several nests were found. Surveys have also been conducted on the North Rim, most recently in 2002 in areas affected by the Outlet Fire. The primary habitat for goshawks within the Park is in the mixed conifer and ponderosa pine habitat on the North Rim. There are approximately ten known goshawk territories in the vicinity of the North Rim developed area and one confirmed territory in the general vicinity of the South Rim range. There is a goshawk territory approximately 1 mile south of the North Rim firing range and approximately 1.5 miles west of the South Rim firing range.

Due to the fact these firing ranges are already in use and have been for many years, that vegetation disturbance would be minimal for the proposed projects and would be limited to the disturbed areas within the ranges themselves, and that nesting, roosting and foraging habitat for goshawks would not be impacted by the proposed projects, impacts to goshawks would be negligible. Short-term impacts as a result of noise disturbance from construction activities have the potential to occur, but would also be negligible due to the fact that the nearest goshawk territories are at least one mile from either range. Therefore, impacts to northern goshawks are expected to be negligible from implementation of any of the alternatives. For this reason, this species was dismissed from detailed analysis.

Spotted Bat and Greater Western Mastiff Bat: These two species are known to occur on the North Rim. Both species roost in cliffs and are insectivorous. Greater western mastiff bats forage above the canopy and spotted bats forage in meadows. Due to the limited scope of the project

and the fact that vegetation disturbance would be minimal and confined to the disturbed areas within the ranges, the proposed project would not affect roosting or foraging habitat or prey populations for these species. Therefore, these species were dismissed from detailed analysis.

Mexican spotted owl and California condor, species listed on the above table, are relevant to this analysis and are discussed further in Chapter 3.

Vegetation
The SRFR is located in a quarry south of Desert View Drive near the park boundary. Surrounding vegetation is ponderosa pine with some scattered Gambel oak in the understory. There are no large trees within the boundaries of the quarry. Outside of the project area are small seedling and sapling ponderosa pine trees with some scattered shrubs and grasses. The NRFR is located in a gravel pit north of the Widforss Trail and Harvey Meadow. Surrounding vegetation is mixed conifer forest with ponderosa pine, white fir and aspen. Although it is possible that some incidental disturbance or removal of smaller seedlings or saplings in the project area may be necessary, rehabilitation activities have negligible potential to increase disturbance to adjacent biotic communities. Therefore, this topic will be dismissed from further analysis.

Exotic vegetation and noxious weeds
Executive order 13112 mandates all federal agencies to examine the impacts of their activities on the status of invasive species. Normal mitigation measures described in Chapter 2 will be followed in order to minimize and prevent the spread of exotic vegetation and noxious weeds.

Cultural Resources
The NPS is mandated to preserve and protect its cultural resources through the Organic Act of August 25, 1916, and through other specific legislation. Applicable laws include the Antiquities Act of 1906, the National Environmental Policy Act of 1969 (as amended), and the National Historic Preservation Act of 1966, NPS Management Policies, the Cultural Resource Management Guideline (DO-28), and the Advisory Council on Historic Preservation's implementing regulations regarding "Protection of Historic Properties" (36 CFR 800). Section 106 of the National Historic Preservation Act of 1966 requires that federal agencies having direct or indirect jurisdiction over undertakings consider the effect of those undertakings on properties on or eligible for listing on the National Register of Historic Places. They must give the Advisory Council on Historic Preservation and the Arizona State Historic Preservation office an opportunity to comment.

Limited archaeological evidence suggests that people have used and/or inhabited the Grand Canyon area for nearly 11,000 years. At the present time, approximately 4000 sites have been recorded within the park boundaries, with only 3% of GRCA lands surveyed. The settlement history for the North and South Rims reflects considerable occupation during AD 1050 to AD 1150, when intensive farming occurred during the summer for approximately 1000 years. Native American use of the North Rim and South Rims and surrounding area is also known in general terms, both from ethnographic accounts and from on-going consultation with the eight affiliated tribes of Grand Canyon. Consultation with American Indians is required for compliance with a variety of laws and other legal entities, such as presidential executive orders, proclamations, and memoranda; federal regulations; and agency management policies and directives. Tribes were consulted for this project, and no traditional cultural properties or ethnographic properties were identified. Although the North Rim encompasses some of the most important archeological sites

in the park, there are only three known archeological sites on the Bright Angel Peninsula, none of which is within or near the boundaries of the NRFR (Euler 1975). Similarly, although the South Rim is rich in archaeological sites, none has been recorded within or near the South Rim firing range. A GRCA archaeological clearance was done in preparation for rehabilitation of both firing ranges (Horn 2002). This document also references an earlier archaeological survey done in the project vicinity in preparation for prescribed burning (Haines, Horn-Wilson, Leatherbury 2000).

No archaeological sites or historic properties have been identified within the project boundaries or within the immediate vicinity of either range. The ranges are located within highly disturbed areas that were used historically as a quarry (South Rim) and as a gravel pit (North Rim). All mitigation guidelines relative to the protection of cultural resources will be followed, both during the initial rehabilitation phase and during the periodic maintenance of the bullet backstops. During the consideration of this topic, it was determined that impacts to cultural resources would not occur during this project and that cultural resources would not influence the choice of alternatives. Further, since all project work will be conducted within the existing disturbed range boundaries, this project is expected to have no impact on cultural resources and has been dismissed from detailed analysis.

Visitor Experience

The 1916 NPS Organic Act and 2001 NPS Management Policies direct national parks to provide for public enjoyment. The SRFR is in an administrative use area and is not open to the public. It is also situated several miles from popular visitor use areas at the South Rim. Although rehabilitation activities may produce a temporary increase in vehicles and noise from construction, these activities are short term and are expected to cause only negligible effects on visitor use. Therefore, continued use of the range, lead abatement actions and construction activities as part of this project are not expected to impact visitors. The NRFR is also in an administrative area only and is also located several miles from typical visitor use areas at the North Rim. It is, however, located approximately 250 feet from the Arizona Trail, and gunshots from the firing range can be heard from the trail when the range is in use. To prevent potential issues from developing because of this proximity, North Rim staff has placed signage at the north and south entrances and exits of the firing range to inform visitors of activities within the range. Additionally, a locked gate blocks the road leading to the range from the Arizona Trial to prevent visitors from accessing the firing range. Also, an employee is stationed as a sentinel during firing range exercises and a patrol vehicle is positioned in such a manner to block anyone from accessing the road to the range (P. Walker, NPS, personal com. via electronic mail March 2003). No further impacts to visitors are expected; therefore, this topic is dismissed from further consideration.

Air Quality

Clean, clear air is essential to preserve the resources in Grand Canyon National Park, as well as for visitors to appreciate those resources. Grand Canyon National Park is a federally mandated Class I area under the Clean Air Act. As such, air in the park receives the most stringent protection against increases in air pollution and in further degradation of air quality related values. This act then sets a further goal of natural visibility conditions, free of human-caused haze. Air quality in the park is generally quite good. Pollution levels tend to fall below the levels established by the Environmental Protection Agency regarding human health and welfare. However, the ability to see through the air (visibility) is usually well below natural levels because of air pollution. Most of this pollution

originates far outside the park's boundaries, and arrives in the park as a well-mixed regional haze, rather than as distinct plumes.

Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. The park's air quality specialist has determined that this project, due to its limited scope, would not require consultation with the State of Arizona regarding air quality. However, because there is some ground disturbance involved in the rehabilitation of the firing ranges, there is a possibility of raising fugitive dust during project implementation or from disturbed areas afterwards. Trenching and other minor on-site work could increase dust and combustion-related emissions, however, this effect would occur only during the construction period and would be localized. By staying within the boundaries of the project area, unnecessary soil disturbance, and consequent dust generation, would be avoided. Water sprinkling can control fugitive dust emissions from light traffic in the project area. Construction equipment itself can adversely affect air quality by exhaust emissions. Minimizing idling would help to reduce this effect and would also help to reduce noise impacts during construction.

Therefore, local air quality may be temporarily degraded by dust generated from construction activities under any of the action alternatives. This degradation would result in an overall negligible impact to air quality that would last only as long as renovation activities occurred. Impacts to overall park air quality or regional air quality are not expected. For these reasons, air quality was dismissed from further analysis.

Soundscape

The NPS is mandated by Director's Order 47 to articulate the Park Service's operational policies that would require, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of "the scenery and the natural and historic objects and the wild life" protected by the NPS Organic Act. They are vital to the natural functioning of many parks and may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern to the NPS because they sometimes impede the Service's ability to accomplish its mission.

Rehabilitation activities would generate some construction-related noise in the vicinity above ambient conditions. Noise sources also include long-term use of vehicles used for accessing the sites for lead removal, power tools and equipment, and additional people in the area conducting the work. To protect the park soundscape during project implementation, noise production must occur outside the curfew established for aircraft overflights, as listed in the mitigation measures developed for this project. Noise impacts from this project would only last the duration of the construction. After construction is completed, any noise level impacts would return to their current condition. All construction would occur during daylight hours when roads and the associated traffic already affect the project area. Any additional traffic would only be temporary and would negligibly affect the areas in the short-term. Since this project would have no measurable impacts on the long-term soundscape in the project area, this topic was dismissed from further analysis.

Floodplains and Wetlands
Executive Order 11988 (Floodplains) and Executive Order 11990 (Wetlands), which require federal agencies to examine the potential impacts of actions on floodplains and wetlands, were reviewed for applicability to this project. Because the project is not in or near a floodplain or wetland and would not affect this resource, floodplains and wetlands were dismissed from further analysis.

Environmental Justice
Executive Order 12898 requires consideration of impacts to minority and low-income populations to ensure that these populations do not receive a disproportionately high number of adverse or human health impacts. This issue was dismissed from further analysis for this project because no alternative would affect everyone equally and would not disproportionately impact minority or low-income populations.

Prime and Unique Farmland
The amended Farmland Protection Policy Act of 1981 requires federal agencies to consider adverse effects to prime and unique farmlands that would result in conversion of these lands to non-agricultural uses. Prime or unique farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. The proposed project locations and surrounding lands have been evaluated by appropriate park technical are specialists and by specialists from the Natural Resources conservation Service (NCRS). Based on their observations, the project area is not considered prime or unique farmland (Camp, personal com. 2002). Therefore, this topic was dismissed from further analysis.

Socioeconomic Environment
Socioeconomic values consist of local and regional businesses and residents, the local and regional economy and park concessions. The local economy and most business of the communities surrounding the park are based on construction, recreation, transportation, tourist sales, services, and educational research; the regional economy is strongly influenced by tourist activity. The GMP EIS discussed the socioeconomic environment and impacts extensively. There may be short-term benefits to the local and regional economy resulting from construction-related expenditures and employment. Local and regional businesses would be negligibly affected in the long-term. Therefore, impacts, both adverse and beneficial, would be negligible and, thus, socioeconomic values were dismissed from further analysis.

ADDITIONAL NEPA ANALYSIS

Environmental effects estimated for this project consider the site-specific effects of all foreseeable actions and mitigation measures. Monitoring during and following implementation of the project would occur to verify effectiveness of mitigation measures and predictions of impact. This EA will guide any subsequent project implementation. If new information or unforeseen and unanalyzed actions become necessary in the future, additional site-specific environmental analysis will be conducted before implementation.

CHAPTER 2 – PROJECT ALTERNATIVES

INTRODUCTION

The NPS has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability include designing park facilities to minimize their adverse effects on natural and cultural values. Objectives also include: maintaining and encouraging biodiversity; constructing and retrofitting facilities using energy-efficient materials and building techniques; operating and maintaining facilities to promote their sustainability; and illustrating and promoting conservation principles and practices through ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The action alternatives subscribe to and support the practice of sustainable planning, design, and human use of the Grand Canyon National Park developed area with its associated public and administrative facilities.

This document analyzes the no-action alternative and three action alternatives. Analysis of the no-action alternative is required under NEPA (40 CFR 1502.14[d]). It provides a baseline for assessing the potential impacts of the Proposed Action and the other action alternatives. In developing alternatives for this project some actions were considered and subsequently dismissed. A brief description of alternatives considered but dismissed from detailed study is included in this chapter. A summary table comparing alternative components is also presented at the end of this chapter.

The preferred alternative is based on preliminary designs and best information available at the time of this writing. Specific distances, areas, and layouts used to describe the alternatives are only estimates and could change during final site design. If changes during final site design were not consistent with the intent and effects of the selected alternative, then additional compliance would be needed as appropriate.

ALTERNATIVE DEVELOPMENT

Bullet-Catching Systems

Several bullet-catching systems were evaluated during the value analysis phase of this project. Alternatives considered but dismissed from further detailed study are discussed in the next paragraph. Three alternatives were ultimately brought forward by NPS staff to address the purpose and need for action. These alternatives were then analyzed further by a park interdisciplinary team to weigh the merits of each alternative against the cost, using "Choosing by Advantages" protocol. These three alternatives are described as Alternatives B, C, and D later in this chapter. An analysis is also made of a "no-action" alternative. The NPS did not identify any additional alternatives for initial lead clean-up or range improvements, other than those described below.

ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED STUDY

Several bullet-catching systems were preliminarily identified during the Value Analysis, but were subsequently dismissed from detailed analysis. These included:

- steel traps - dismissed because they are designed for shooting at a specified angle, a technology more appropriate for an indoor range; also generate an increase in lead dust and fragmented lead.
- *SACON* (Shock Absorbing Concrete) - dismissed because it is not yet available for small arms ranges
- bentonite traps - dismissed because of ricochet and fragmentation risks
- granular rubber traps - dismissed as suitable only for high volume rounds per year
- use of wooded areas backstops - dismissed because this could impede lead reclamation activities
- filter beds (a combination of sand traps with limestone dolomite or gypsum) - dismissed because they are not effective in Arizona soils.

The alternatives selected for detailed analysis were those alternatives considered important to the decision being made and those that best represented the full range of possible environmental consequences, while still meeting the purpose and need for the action and project objectives. Alternatives considered for detailed analysis are presented in the next section.

ALTERNATIVE DESCRIPTIONS

Alternatives are described below. Table 2 summarizes the primary components of each alternative, and Table 3 summarizes the expected impacts from implementation of the alternatives.

Alternative A – No-action

Alternative A does not meet the purpose and need for the project, but provides a baseline for comparison with the action alternatives. Alternative A would maintain the existing conditions at the firing ranges. Lead has accumulated in the earthen backstops at both ranges, over their many years of use. The reason that lead has been allowed to accumulate in the earthen backstops is that there is no system in place that will allow efficient clean up. Existing facilities do not meet modern standards for firing ranges and have been allowed to deteriorate for many years.

ITEMS APPLICABLE TO ALL ACTION ALTERNATIVES

There are several components that are applicable to all of the action alternatives and are described below. These project components are analyzed as part of the actions described under Alternatives B, C, and D. Mitigation measures developed for action alternatives would also apply to these components, and are listed in the Mitigation Measures section of this chapter.

1. **Lead Reduction**

   Lead reduction activities would be common to all of the action alternatives. Before any bullet catching system is installed, soil from the areas with heaviest concentrations of lead at both ranges would be cleaned and recycled. Initial clean up will be accomplished with heavy equipment. A front-end loader will be used to scoop dirt from the earthen backstops and to

fill dump trucks for removal from the site. Some of the dirt may be screened onsite and the lead removed for recycling. At the South Rim range, the heaviest concentrations are located at the north end of the range, within the existing earthen berm backstop that has been used for many years (Figure 4). At the North Rim range, the heaviest concentrations are located at the east end of the range, also within the existing earthen berm backstop (Figure 5).

2. **Rehabilitation of Existing Facilities**
   Rehabilitation of existing facilities at both firing ranges would be common to all of the action alternatives. At the South Rim range, the proposal calls for addition of a small metal storage shed, which will be located at the south end of the range. At the North Rim range, an existing wooden storage shed is inaccessible in the winter, because of heavy snow. The proposal calls for the addition of steps above-grade for ease of access to the shed in a heavy snow pack. Three of the existing five lanes at the North Rim would be eliminated. The number of lanes at the South Rim will remain the same.

Alternative B (preferred alternative) - Shredded Rubber

Alternative B consists of placing a "backstop" of loose, shredded rubber on a reinforced concrete base cast on compacted earthen berms at both ranges (Figure 6). With this system, bullets are captured without fragmentation and migrate toward the bottom of the rubber for easy retrieval. The media consists of recycled rubber tires, and the spent bullets can be easily retrieved as scrap metal without being considered hazardous waste. Although the shredded rubber system ranks highest in initial cost, it has the lowest maintenance costs of any of the other proposals. It also outranked the other alternatives in providing the most bullet containment without fragmentation or possible contamination to the soil. It is non-hazardous in regard to waste and nearly as passive as soil. Fragmented bullets would not come in contact with surface water with this system, nor would it have any seasonal limitations.

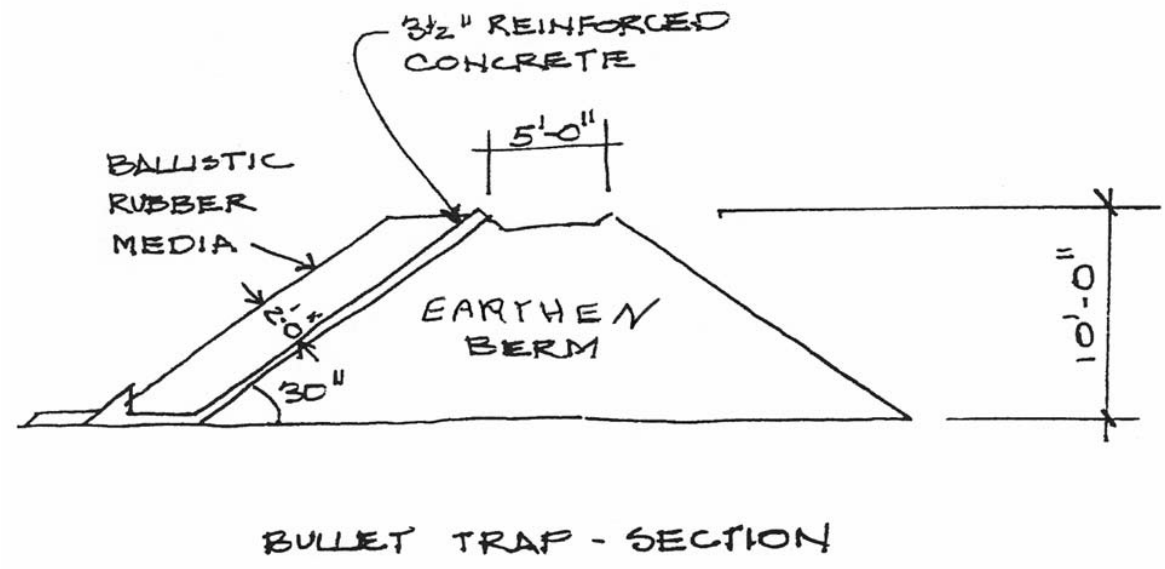


FIGURE 6 – PREFERRED ALTERNATIVE

Alternative C – Rubber Blocks
Alternative C consists of the placement of rubber blocks with rubber back-up panels and a steel support frame. Bullets are captured in the solid blocks of recycled rubber; however, the manufacturer's representative did not have any data proving that the channels within the rubber blocks were effective in the recovery of spent bullets and lead shot. When the blocks meet a maximum capacity of lead, they must be either repositioned to a little-used area of the berm or disposed of as hazardous waste. To date, there is no smelter to perform this process, nor is there an efficient way to remove the spent bullets and lead from the blocks. Since the blocks can weigh up to 80 pounds, repositioning blocks would require the use of small equipment, such as a Bobcat. There were no illustrations available for this system to include here.

Alternative D – Engineered Sand Berm
Alternative D requires removal of the existing berm and installation of a new berm of engineered sand built to meet the standards needed for slope stability and acceptability for ballistics. These traps are typically 15-20 feet high. Spent bullets remain close to the point of impact in the berm. It is critical that the uppermost layer (to a depth of 1-2 feet) is free of large rock or other debris to prevent ricochet and bullet fragmentation and to facilitate reclamation. The sand material must be sifted every 2-3 years to minimize ricochet and fragmentation. Also, once the traps become saturated with bullets, the sand must be sifted to remove the bullets. Some hazardous waste may be generated over time, and bullet fragments could come into contact with surface water (VA 2001). The engineered sand berm referred to here would be similar in configuration to the one displayed in the illustration above for Alternative B (Figure 6), except that it would be somewhat higher. No illustrations were available for this system to include here.

IDENTIFICATION OF THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which guides the Council on Environmental Quality (CEQ). The CEQ provides direction that "[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101:

1) **Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.** The preferred alternative (B) would best promote long-term protection of the resources of wildlife, soils and water through the installation of a bullet-catching system that is easily cleaned and is nearly as passive as soil. There is no possibility of contamination to soil and water with this system. Alternative C, rubber blocks, would also provide an adequate bullet catching system; however, no data is available that the channels within the rubber blocks are effective in the recovery of spent bullets and lead shot. With Alternative D, an engineered sand berm, there may be some hazardous waste generated over time due to movement of lead through the sand. There is a possibility that bullet fragments could come into contact with surface water over time.
2) **Assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings.** All of the alternatives would improve existing facilities so that they meet modern firing range standards, increasing safety and health of administrative staff who use the ranges.

3) **Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences**. The preferred alternative provides the most containment without fragmentation of bullets or contamination of the soil and allows easy recovery of spent bullets for recycling. There is no possibility of contamination to soil and water with this system. Alternative C, rubber blocks, would also provide an adequate bullet catching system; however, no data is available that the channels within the rubber blocks are effective in the recovery of spent bullets and lead shot. With Alternative D, an engineered sand berm, there may be some hazardous waste generated over time due to movement of lead through the sand. There is a possibility that bullet fragments could come into contact with surface water and soil.
4) **Preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.** One portion of this criteria that applies to the current project is that the level of lead at these sites would be measurably reduced by any of the alternatives. The potential for wildlife to find and ingest lead would thus be appreciably reduced in the project areas.
5) **Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.** All of the alternatives would provide a high quality working environment for law enforcement staff, as well as promoting long-term protection of wildlife. With alternatives C and D, recovery of spent fragmented lead would not be as efficient as with the Preferred Alternative. With Alternative D, an engineered sand berm, there may be some hazardous waste generated over time due to movement of lead through the sand. There is a possibility that bullet fragments could come into contact with surface water and soil.
6) **Enhance the quality of renewable resources and approach the maximum attainable recycling of depleteable resources.** The preferred alternative would use recycled rubber for the bullet-containment system, and would facilitate easy long-term recycling of lead. With alternatives C and D, recovery of fragmented lead would not be as efficient as with the Preferred Alternative.

Using selection factors from the Choosing by Advantages process and through the process of internal scoping, scoping with the public and other agencies, the environmentally preferred alternative selected is Alternative B. Alternative B best meets the purpose and need for action and best addresses the overall Park Service objectives and evaluation factors. No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Alternative B is recommended as the Preferred Alternative and meets both the Purpose and Need and the project objectives.

MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES

To minimize resource impacts, the mitigation measures outlined below would be followed during implementation of any of the action alternatives, and are analyzed as part of the action alternatives. These actions were developed to lessen the potential for adverse effects of the proposed action, and have proven to be very effective in reducing environmental impacts on previous projects.

- All staging areas will be in previously disturbed sites and would be returned to pre-construction conditions once construction is complete. Standards for this, and methods for determining when the standards are met, would be developed in consultation with the Park Restoration Biologist.

- If dust becomes a problem during work, sprinkling with water would occur to reduce dust, both on roadways used and/or in the construction site.

- Construction equipment will not idle any longer than the minimum needed for proper mechanical operation.

- Construction zones would be fenced with construction tape, snow fencing, or some similar material before any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

- Prior to construction activities, the park Restoration Biologist will survey the site for exotic species so that exotics can be treated. Some small seedlings and saplings may need to be removed prior to disturbance. Vehicles used at the site will be pressure-washed prior to entering the park to further minimize the introduction of exotic species. Construction workers and supervisors would be informed about special status species. Contract provisions would require the cessation of construction activities if a species were discovered in the project area, until park staff re-evaluates the project. This would allow modification of the contract for any protection measures determined necessary to protect the discovery.

- California condor and Mexican spotted owl conservation measures developed as part of the "Batch" consultation with Fish and Wildlife Service (NPS 2002) for construction projects in the park would be adhered to during project implementation. This would include confirming distances to the latest confirmed condor nests and Mexican spotted owl protected activity centers, restricting noise related to construction activity when necessary, and taking appropriate and agreed-to precautions if condors occur at the project site. If condors are feeding in the vicinity of the firing ranges, construction may be halted until such time as the condors leave the site. The Fish and Wildlife Service concurred with the park's determination that implementation of the rehabilitation of the firing ranges is not likely to adversely affect the Mexican spotted owl or the California condor. Concurrence was received on July 9, 2002.

- If previously unknown archeological resources are discovered during construction, a park archeologist will be contacted immediately. All work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed. This would be done in accordance with the stipulations of the 1995 Programmatic Agreement Among the National Park Service, the Arizona State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the General Management Plan/Environmental Impact Statement, Grand Canyon National Park, Arizona.

- All workers would be informed of the penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers would also be informed of the correct procedures if previously unknown resources were uncovered during construction activities.

- To minimize the potential for impacts to park visitors, variations on construction timing would be considered. Unless additional time is authorized by park management, operation of construction equipment would not occur between the hours of 6 PM to 7 AM in summer (May – September), and 6 PM to 8 AM in the winter (October – April). Adherence to these hours would minimize the impacts of noise from construction activities to visitors and would help preserve the Canyon's natural quiet.

- To further minimize the potential for impacts to park visitors, the section of Arizona Trail near the North Rim firing range will be posted with additional signage to inform visitors of the presence of the firing range. A road extending from the Trail to the firing range will be blocked at the Arizona Trail with a locked gate. Rangers accessing the range would also do a check for dispersed campers in the vicinity of the range prior to using the range for practice.

ALTERNATIVES AND PROJECT OBJECTIVES

The objectives of the action are described in Chapter 1 and also listed here. The preferred alternative clearly addresses each of these objectives. Alternatives that were considered but dismissed from further analysis were dismissed in part because they did not sufficiently address one or all of these project objectives. Table 2 displays alternative components and compares the ability of the alternatives to meet the project objectives.

1. Conducting lead abatement at both firing ranges

All of the alternatives address removal of soil from areas with highest lead concentrations at both ranges.

2. Installation of a bullet-catching system

All of the alternatives provide long-term lead abatement with a bullet-catching system. All of the systems would function in all weather conditions and would be non-ricocheting. Differences between the systems focus on the way in which lead is recovered from the medium and also on ease and frequency of maintenance.

- The shredded rubber backstop (Alternative B) is non-hazardous in regard to waste and nearly as passive as soil. Bullets are captured without fragmentation and migrate toward the bottom of the rubber for easy retrieval and maintenance. It also has the lowest maintenance costs of any of the other proposals.
- The rubber blocks (Alternative C) require repositioning on a regular basis, which then requires the regular use of heavy equipment at the ranges. When the blocks meet a maximum capacity of lead, they must be disposed of as hazardous waste. To date, there is no smelter to perform this process, nor is there an efficient way to remove the lead from the blocks.

- The engineered sand berm (Alternative D) must be sifted every 2-3 years to minimize ricochet and fragmentation – or whenever it becomes saturated with lead. There is the possibility that hazardous waste may be generated over time, and bullet fragments could come into contact with surface water.

3. **Improving efficiency and safety of park operations by rehabilitating facilities at each range.**
   - All of the alternatives allow rehabilitation of facilities at each range. All will accommodate handgun, shotgun, and rifle and provide a minimum 50 yard range.

Table 2 – Summary of All Alternative Components

	Alternative A – No-Action	Alternative B - Preferred Alternative –	Alternative C	Alternative D
Lead Abatement	None – Existing levels of contamination remain.	Soil from areas of heaviest lead deposits will either be cleaned on-site and lead recycled, or hauled to a landfill approved for lead disposal.	Soil from areas of heaviest lead deposits will either be cleaned on-site and lead recycled, or hauled to a landfill approved for lead disposal.	Soil from areas of heaviest lead deposits will either be cleaned on-site and lead recycled, or hauled to a landfill approved for lead disposal
Bullet Catching System	Existing Earthen Berms	Shredded rubber media on reinforced concrete poured on front of earthen berm. Allows easy long-term recovery of spent bullets for recycling. Provides most containment without fragmentation.	Rubber blocks with rubber back-up panels and steel support frame. Requires use of heavy equipment to reposition blocks on regular basis. No efficient way to remove spent bullets and lead from blocks. Blocks eventually must be disposed of as hazardous waste.	Engineered sand berm built to meet standards needed for acceptability for ballistics. . Provides containment with *some* fragmentation. Sand must be sifted to remove bullets for recycling. Hazardous waster may be generated over time.
Range Improvements	None – Existing improvements remain "as is"	At SRFR, a small metal storage shed will be placed at the south end of the range. At the NRFR, steps above-grade would be added to an existing shed for ease of access in heavy snow pack. Lanes at the NRFR will be reduced from five to two.	Same as Alternative B	Same as Alternative B
Accomplishment of Project Objectives	None of project objectives accomplished.	All project objectives accomplished.	Some project objectives accomplished.	Some project objectives accomplished.

Table 3 – Comparative Summary of Environmental Impacts

Impact Topic	Alternative A –No-Action	Alternative B – Shredded Rubber Backstop	Alternative C – Rubber Blocks	Alternative D – Engineered Earthen Berm
Soils and Water	Elevated concentrations of lead detected in surface soils would remain. Possibility of contaminated water leaching into soil remains. Has potential to directly & indirectly effect the soils/ground water. Effects could be adverse and range from negligible to moderate.	No possibility of contaminated water leaching into soil. Bullets removed from rubber easily as non-hazardous waste. No hazardous waste generated. Effects will likely be beneficial and minor to moderate.	Bullets will not come into contact water or soil; thus, no possibility of contamination. Cannot easily remove bullets from rubber. Bullets must be disposed of as hazardous waster. Long-term effects could be adverse & minor to moderate.	Bullet fragments may come into contact with water – could cause contamination. Bullet removal system could allow lead build-up in soil. Some hazardous waste may be generated over time. Effects could be long-term, adverse and minor to moderate.
Special Status Species	Project area would be maintained in current state. Alternative A would result in no effect to MSO. Continued use of ranges without lead abatement activities would result in minor to moderate, long-term, local adverse impacts to condors.	Lead abatement activities would minimize risks to condors. Provides least ground disturbance to sites. Alternative B may affect, but is not likely to adversely affect MSO or condor. Beneficial impacts to condors as a result of lead abatement and backstop installation expected.	Lead abatement activities would minimize risks to condors. Provides little ground disturbance to sites for initial construction, but requires more maintenance & more long-term disturbance. May affect, but is not likely to adversely affect MSO or condor. Beneficial impacts to condors as a result of lead abatement and backstop installation expected.	Lead abatement activities would minimize risks to condors. Provides most ground disturbance. May affect, but is not likely to adversely affect MSO or condor. Beneficial impacts to condors as a result of lead abatement and backstop installation expected.
Park Operations	Project area would be maintained in current state. Safety & efficiency issues would remain. Maintenance could increase as existing buildings age. Impacts would be moderate, local, long-term, and adverse.	Minimal level of maintenance and least impact to park operations. No seasonal limitations. Effects will likely be beneficial and minor to moderate.	Partial media replacement every 2-3 years. Some maintenance required. No seasonal limitations. Effects will likely be beneficial and minor to moderate.	Berms must be sifted and supplemented every 2-3 years. Could saturate and erode. Seasonally limited. Effects will likely be beneficial and minor to moderate.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

ALTERNATIVES AND PROJECT OBJECTIVES

This chapter describes the present conditions (i.e. affected environment) within the project area and the changes (i.e. environmental consequences) that can be expected from implementing the action alternatives or taking no-action at this time. The no-action alternative sets the environmental baseline for comparing the effects of the other alternatives. The impact topics discussed in chapter 1 define the scope of the environmental concerns for this project. The environmental effects, or changes from the present baseline condition, described in this chapter reflect the identified relevant impact topics, and include the intensity and duration of the action, mitigation measures and cumulative effects.

The National Environmental Policy Act (NEPA) requires that environmental documents disclose the environmental impacts of proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the proposed action be implemented.

METHODOLOGY

The impact analysis and conclusions contained in this chapter were based on park staff knowledge of the resources and sites; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies; and professional judgement. Potential impacts in this chapter are described in terms of type (either beneficial or adverse), context (site-specific, local or even regional), duration (short-term or long-term?), and intensity (negligible, minor, moderate or major). Because definitions of intensity can vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this EA.

For purposes of impact analysis in this chapter, the following definitions of duration are used to characterize impacts discussed.
Short-term – temporary effects typically confined to the construction period.
Long-term – more permanent effects that will remain following construction.

CUMULATIVE IMPACTS

Cumulative impact is defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time (40 CFR 1508.7). Therefore, it is necessary to identify

other ongoing or foreseeable future actions within the vicinity of the project area. Some future actions on the South Rim that were considered during the cumulative impact analysis include: rehabilitation of Horace Albright Training Center and Yavapai Observation Station; ongoing construction of a paved pathway for pedestrians and bicycles; improvement of all pedestrian walkways; construction of a new NPS maintenance facility; and upgrading restroom facilities throughout the South Rim. On the North Rim, examples of ongoing or foreseeable future actions within the vicinity of the project area include the following: construction of a new North Rim administrative building and emergency service facility, rehabilitation of twenty-six one-room cabins and a campground, rehabilitation of the North rim water distribution system, upgrading several restrooms, and construction of a 44-unit dormitory for employee use.

For this analysis, foreseeable future actions were considered actions that could occur at GRCA within the next 5 years or that currently have funding or for which funding is being sought. Five years was selected as the period for foreseeable future actions because many of the actions identified in the GMP are likely to either be planned or implemented by that time. Cumulative impacts are expected to be similar for any alternatives selected because of the small amount of disturbance relative to the watershed as a whole. If the No-Action Alternative was selected, and all other future projects were implemented, the impacts to the natural environment would still be similar to those that would occur if any one of the action alternatives for this project were selected. Because implementation of this project is expected to result in minimal impact to the natural environment, a watershed analysis was not used for this project. Cumulative impacts are described in this chapter for each impact topic. There has been extensive analysis for other GRCA projects. Foreseeable future actions in the vicinity of the SRFR and the NRFR are listed and described briefly in Appendix B.

IMPAIRMENT OF PARK RESOURCES OR VALUES

In addition to determining the environmental consequences of implementing the alternatives, National Park Service policy (*Management Policies 2001*) requires analysis of potential effects to determine whether actions would impair park resources. The fundamental purpose of the National Park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;

- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning document.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. The potential for impairment is discussed for each applicable resource for each alternative in this chapter. A statement summarizing the conclusions of this evaluation is included in the conclusion statement at the end of the "environmental consequences" section for each applicable resource.

NATURAL RESOURCES

SOILS AND WATER

Affected Environment

The developed areas of both the South and North Rims, including the project location, are underlain by Kaibab limestone, a very porous and fossil-laden rock layer. Little or no surface water is present because water penetrates through the soil and rock layers quickly. Except for a few sinkhole lakes and wet meadows on the North Rim, soils are all well drained. Soils tend to be shallow and poorly developed, but stable, with frequent rock outcroppings. Productivity of most soils in the park is low, so that revegetation is slow and usually requires considerable maintenance. North Rim soils are generally deeper and retain more moisture than South Rim soils; therefore revegetation efforts are generally more successful on the North Rim (GMP 1995). The Natural Resources Conservation Service (NRCS) has been conducting a soil survey of the Grand Canyon over the last several years. The study has documented that soils in the developed area of both the North and South Rims are generally rocky and cobbly, with varying amounts of clay. Bedrock is typically 30-60 inches below the soil surface (NRCS 2001). Soils in the project area are in satisfactory condition (indicating the soil has retained its inherent productivity). This is due to the presence of needlecast and downed woody material that protects the soil from erosion by preventing raindrops from directly impact soil particles and the overall lack of any previous significant ground disturbance such as wildlife or domestic livestock grazing pressure (Kohnke and Franzmeier 1995).

As previously discussed in Chapter 2, the firing range sites are subject to all pertinent State and Federal environmental regulations with regard to unauthorized release of potential contaminants to the environment beyond the immediate boundaries of the ranges. In other words, if contamination to subsurface soils, surface water, air, and/or groundwater were to occur, the firing ranges would be subject to all pertinent State and Federal regulations. As an active, properly operated, and maintained small-arms range, these facilities are not currently subject to requirements under the RCRA or the Military Munitions Rule. If, however, the park were to cease operations at the ranges, then the soils and associated ammunition debris would be subject to the solid/hazardous waste transportation, storage and disposal requirements under RCRA. Authority does exist under RCRA (Section 7003) to compel remediation when an imminent and substantial endangerment to health or the environment (e.g., contamination to a sensitive habitat or to a drinking water supply) may have been created by munitions fragments at a firing range. According to NPS staff (Carr 2001), "It is highly unlikely that the firing ranges at GRCA would

fall into this category because the alkaline soils and depth of water table lower considerably the potential of lead 'leaching' through the soil into the water table." The Redwall formation at 3500 feet below ground surface is identified as the regional aquifer and the source of drinking water for both the North and South Rims of GCNP (Rihs, GRCA Hydrologist). There is no standing water nor are there any major drainages in the vicinity of either project. There is no riparian habitat present within or adjacent to either shooting range. Although the North Rim has a few sinkhole ponds, wet meadows and small springs, there is very little surface water on the plateaus of Grand Canyon National Park, and there is no surface water within the developed portions of the North or South Rims. Most water movement in this area is subsurface flow.

An assessment of the impact of migration of recognized environmental conditions in connection with both firing ranges was done by Tetra Tech NUS (TtNUS) in 2002. Elevated concentrations of lead were detected in the surface soils associated with the earthen berm backstops currently in use at both firing ranges (as was expected). TtNUS has recommended that the earthen berms be replaced with some type of bullet containment system. They also recommended that the extent of the lead in the soils and subsoils within the ranges be determined and that existing lead is disposed of in a permitted landfill facility.

Environmental Consequences

Methodology

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: the impact is on soils and water will be barely detectable, i.e. barely measurable with no perceptible effects

Minor: the impact on soils and/or water is slight but detectable, with few perceptible effects, and localized in area.

Moderate: the impact on soils and /or water is readily apparent and measurable.

Major: the impact to soils and/or water is severely adverse or exceptionally beneficial.

Alternative A – No Action

Direct/Indirect Impacts

Although the alkaline soils and depth of the water table on the North and South Rims considerably greatly reduce the potential of lead leaching through the soil into the water table, the no-action alternative could result in indirect contamination to soil and water. Although elemental lead is not mobile in the environment and pure unaltered lead bullets and shot lying on the ground are not a contaminant threat to ground or surface water, certain compounds of lead can migrate in soil and water after the lead is oxidized. In Arizona, where we have relatively low rainfall and neutral to alkaline clay soils, it would be rare to have lead penetrate beyond the top 6-12 inches of soil. There are, however, a number of physical factors that could affect the movement of lead contaminants through soil and ground water. These include topography and runoff direction, annual precipitation, soil permeability and soil type, range size and density of vegetation. These environmental factors are subject to natural forces, whereas park management does have the ability to control factors such as bullet size and volume and operating schedules. In the rare instance where rainfall was extremely high, it would be possible for lead compounds to migrate out of the range boundaries and to cause contamination to ground or surface water. Although the potential for impacts to soils and water from implementation of this project is considered

negligible, the potential for mobility of the oxidized compounds generated from lead bullets is controlled by environmental factors such as intensity and frequency of rainfall, soil permeability and soil type. Thus, the no-action alternative has the potential, albeit small, to directly or indirectly effect the soils and ground water in Grand Canyon National Park. These effects could range from negligible to moderate, depending upon various environmental factors.

Cumulative Impacts
As described above, implementation of the no-action alternative has the potential to result in long-term and possibly widespread impacts to soils and ground water around the Grand Canyon, when combined with past, present and foreseeable future projects (Appendix B). These cumulative effects could range from negligible to moderate, depending upon circumstances of weather and the number of years that the ranges are allowed to remain in use.

Impairment
Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning document, there would be no impairment of the park's resources or values.

Effects Common to All Action Alternatives
There are certain general beneficial and long-term effects that would be common to all of the action alternatives. Because there are recognized environmental hazards within the project area, specifically, expended lead bullets and lead powder on the ground surface, it is likely that beneficial direct and indirect impacts to soils and ground water would result from implementation of any of the alternatives. All of the action alternatives would provide for some initial removal of lead from the areas of highest concentration at each range. In addition, all of the action alternatives are designed to improve the ranges, in so far as providing a bullet-containment system and upgrading facilities. The primary differences between the three action alternatives focus on the type of bullet catching system installed and whether the system would allow the possibility of lead fragments or powder coming into contact with soil and/or ground water

Alternative B
With alternative B (shredded rubber backstop), there is no possibility of direct or indirect contamination to ground water or soil. Bullets may be removed from the rubber backstop easily and are regarded as non-hazardous waste by legal definition. There is no possibility of hazardous waste being generated with this system. Alternative B provides the most containment of all of the alternatives, with no possibility of fragmentation. Effects will likely be long-term, beneficial and minor to moderate.

Alternative C
With alternative C (rubber blocks), bullets will not come into contact with water or soil, and there would be no possibility of direct or indirect contamination to ground water or soils. However, bullets are removed from the rubber blocks through a grinding process. Bullets cannot be easily removed from the rubber blocks and must be disposed of as hazardous waste. In other words, this system uses a recyclable material but results in a hazardous byproduct. With this system, bullets

remain at the point of impact; however, they can ricochet at saturation. Effects could likely be adverse, long-term, and minor to moderate.

Alternative D
With alternative D (engineered sand), bullet fragments remain close to the point of impact and could come into contact with surface soils and water. During periods of heavy rain, the surface lead in the soil could be washed away from the engineered sand berm and could therefore cause contaminated ground water. The bullet removal method requires sifting and re-use of the sand, and could allow for lead build-up in the soil. Some hazardous waste may be generated over time with this system, although it does allow recycling of some of the lead. The effects could be adverse, long-term, and minor to moderate.

Cumulative Impacts
It is likely that beneficial and long-term cumulative impacts to soils and ground water would result from this project. There are recognized environmental hazards within the project area: specifically, expended lead bullets and powder on the existing backstop surfaces. This project would remove lead from the soil, prevent lead from entering the soil and ground water, and help prevent sedimentation and erosion at the firing ranges. Although heavy equipment will be used during the initial rehabilitation phase and during periodic maintenance, these effects are expected to be short term and negligible. While it is difficult to quantify the level of effect, cumulative beneficial impacts are expected to be minor to moderate when combined with other past, present and foreseeable future projects.

Impairment
Direct, indirect, and cumulative impacts to the soils and groundwater resources would be minor as a result of implementing any of the action alternatives. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's soil and groundwater resources or park values.

Conclusions
The no-action alternative has the potential, albeit small, to directly or indirectly effect the soils and ground water in Grand Canyon National Park. These effects could range from negligible to moderate, depending upon various environmental factors. The possibility for impacts to soil and water resources would be less with Alternative B than with Alternatives C and D; and there is the possibility that adverse direct and indirect impacts to soils and ground water could result from implementation of alternatives C and D. With any of the action alternatives, lead would be removed from the soil and prevented from entering the soil and groundwater. Any of the action alternatives could help prevent sedimentation and erosion at the firing ranges. Overall impacts of any action alternatives would be minor to moderate.

SPECIAL STATUS SPECIES

Affected Environment

Mexican Spotted Owl

The Mexican spotted owl (MSO) was listed as a threatened species in March 1993, and a recovery plan was issued in 1995. MSO typically breed and roost in deep canyon or diverse forested habitats. They are associated with late seral forests and are generally found in habitat that includes mixed conifer and pine-oak forests, riparian madrean woodland, and sandstone canyonlands (USFWS 1995). However, MSO have been found in relatively open shrub and woodland vegetation communities in arid canyonland habitat (Willey 1995). Nesting habitat is typically in areas with complex forest structure or rocky canyons containing mature or old growth stands that are uneven-aged and multi-storied with high canopy closure. MSO usually nest in abandoned stick nests or in cavities in trees or cliffs. Tree nests can be on platforms such as old raptor nests or witches' brooms formed by dwarf mistletoe (*Arceuthobium* sp.) or in cavities formed by broken-off branches or tree tops. Nests in rock canyon areas are usually in cavities in the rocks or in caves (Ganey and Dick 1995).

The diet of the MSO varies depending on location and habitat. Generally it consists of small and medium-sized mammals such as peromyscid mice, voles (*Microtus* spp.), pocket gophers (*Thomomys* spp.), ground squirrels (*Spermophilus* spp.), and woodrats (*Neotoma* spp.). Woodrats are the most common and important prey item range-wide, as measured in frequency in the owls' diet and in biomass consumed (Ward and Block 1995). Other animals that may occasionally be consumed include small birds (usually Passeriformes), lizards (*Sceloporus* spp.), bats (Chiroptera), beetles (Coleoptera), and rabbits (*Sylvilagus* spp.). MSO use a wider variety of forest conditions when foraging than when nesting or roosting, and a diverse prey base is dependent on the availability and quality of diverse habitats. Spotted owls typically forage at night, although diurnal foraging has also been observed.

The presence of MSO within Grand Canyon National Park was confirmed in 1992 through field surveys of approximately 2,430 ha (6,000 acres) of suitable habitat on the North and South Rims. Additional MSO surveys occurred in 1994 and 1995 along the South Rim and in 1998 and 1999 along the North Rim. These surveys did not detect any spotted owls. In 1999, additional surveys were conducted in side canyon habitat along the Colorado River corridor and responses were received at six locations. Surveys continued along the river corridor in 2001, with new owls located (Willey and Ward, in prep. 2001). An extensive owl survey was initiated in 2001 with crews surveying the inner canyon and river corridor, owl habitat below the North and South Rims, and portions of the North and South Rim plateaus. A second year of surveys for these same areas was completed in 2002. Surveys in the project area specific to Mexican spotted owls were conducted during 1998, 1999, 2001, and 2002.

Critical habitat for MSO was designated in 2001 and includes most of the Park except the South Rim. Owl habitat in Grand Canyon National Park is cool canyon habitat defined as areas with low thermal intensity, short thermal duration, and steep slopes (Spotskey and Willey 2000). Predicted habitat has been spatially defined through a geographic information system (GIS) model and may or may not include forested habitat; i.e., the coolness and short thermal duration may be a result of vertical rock faces, cliff walls, and aspect and not necessarily because an area has dense vegetative canopy cover.

The size and extent of the MSO population at Grand Canyon is currently unknown; however, survey results suggest that MSO occupy the rugged canyonland terrain within the Grand Canyon. Detections of MSO indicate they are utilizing small stringers of Douglas-fir trees below the rim (D. Spotskey, NPS, personal com. via electronic mail to Deborah Lutch 05/23/00). No MSO's are known to occupy the plateau areas of the Park.

The Park falls within the Colorado Plateau Recovery Unit. The Mexican Spotted Owl Recovery Plan (USFWS 1995) provides for three levels of habitat management: protected areas, restricted areas, and other forest and woodland types. Approximately 40 MSO Provisional Protected Activity Centers (PACs) have been designated for known MSO locations in the Park as of 2002 (Spotskey, personal com. to Deborah Lutch via electronic mail 9/5/02). Protected habitat in the Colorado Plateau Recovery Unit includes any PACs, designated wilderness areas, and any mixed conifer forests on slopes over 40%. Restricted habitat in the Colorado Plateau Recovery Unit includes mixed conifer forests or riparian habitats that have primary constituent elements. Primary constituent elements in these habitat types include high basal area of trees, uneven-aged structure, and high snag basal area. Primary constituent elements in canyon habitat include cooler and more humid conditions than in the surrounding area; clumps or stringers of trees; canyon walls with crevices, ledges or caves; high percent cover of ground litter or woody debris; and riparian or woody vegetation.

Spotted owls have been detected below the North Rim in Transept Canyon, to the southwest of the project area. The PAC boundary is greater than two miles from the North Rim firing range. The North Rim firing range does not provide habitat for MSO. While the habitat surrounding the range is considered mixed conifer, it has been surveyed for MSO's and no MSO's have been detected. Spotted owls have been detected below the South Rim to the west of Yaqui Point north of the project area. The PAC boundary is greater than one mile from the South Rim firing range. The South Rim firing range does not provide habitat for MSO, and the surrounding habitat is ponderosa pine.

The primary threats cited for the owl in most Recovery Units include large-scale catastrophic wildfire and timber harvest. Potential threats cited specifically for the Colorado Plateau Recovery Unit focus more on recreational impacts, road building, and overgrazing.

California Condor

California condors ((*Gymnogyps californianus*) are large birds that reach sexual maturity by 5-6 years of age. They are strict scavengers and rely on finding their food visually, often by investigating the activity of ravens, coyotes, eagles, and other scavengers. Without the guidance of their parents, young inexperienced juveniles may also investigate human activity. As young condors learn and mature this human-directed curiosity diminishes.

The California condor was listed as an endangered species in March 1967. In 1996, the USFWS established a nonessential, experimental population of California condors in northern Arizona. In December 1996 the first condors were released in the Vermilion Cliffs area of Coconino County, Arizona, approximately 48 km (30 miles) north of Grand Canyon National Park. Subsequent releases have occurred in May 1997, November 1997, November 1998, December 1999, February 2002, and March 2003 in the same vicinity and in the Hurricane Cliff area, which is about 96 km (60 miles) west of Vermilion Cliffs. By declaring the population "nonessential, experimental", the USFWS can treat this population as "threatened" and develop regulations for

management of the population that are less restrictive than mandatory prohibitions covering endangered species. This facilitates efforts to return the condor to the wild by providing increased opportunities to minimize conflict between the management of the condors and other activities. Within Grand Canyon National Park, the condor has the full protection of a threatened species (NPS 1991).

Nesting habitat for California condors includes various types of rock formations such as crevices, overhung ledges, and potholes. California condor foraging occurs in both open terrain and forested areas. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and hours of waiting at a roost or on the ground near a carcass. Roost sites include cliffs and tall trees, including snags (61 FR 54043-54060).

As of January 2003, the population of free-flying condors in Arizona totaled 35. All of the California condors in northern Arizona are fitted with radio transmitters that allow field biologists to monitor the condors' movements. Condors have been observed as far west as the Virgin River and west and south as Lake Havasu; south to the San Francisco Peaks outside of Flagstaff, Arizona; north to Zion and Bryce Canyon National Parks and beyond to Minersville, Utah; and east to Mesa Verde, Colorado and the Four Corners region (Peregrine Fund 2000). Monitoring data indicate condors are using habitat throughout Grand Canyon National Park, with concentration areas in Marble Canyon, Desert View to the Village on the South Rim, and the Village to Hermits Rest. Potential nesting habitat exists throughout the Park. One nesting attempt was documented in the Marble Canyon area in 2001. Two nest sites on the South Rim, one on The Battleship and one on Dana Butte, were initiated in 2002. Both nest sites failed. It is unclear whether condors would select nesting areas in close proximity to developed portions of the Park. No condor nesting attempts have occurred in the vicinity of either the North Rim firing range (early indications of a condor nest site are greater than 4 miles southwest of the project area) or the South Rim firing range (greater than 5 miles northwest of the project area).

The main reason for the decline of condors was an unsustainable mortality rate of free-flying birds combined with a naturally low reproductive rate. Most deaths in recent years have been related to human activity. Lead poisoning from ingestion of carrion and power line collisions is considered the condor's primary threats. There have also been deaths from shooting and deliberate poisoning.

Environmental Consequences

Methodology

The thresholds of change for the intensity of an impact on special status species are defined as follows:

Negligible – No impacts to listed special status species or impacts that are only temporary in effect are expected. These temporary effects would be short-term, localized and not perceptible. For purposes of Section 7 under the Endangered Species Act, the determination of effect would be *no effect* to listed species or their habitat.

Minor – a measurable but small, localized change to a population or individuals of a species or to designated critical habitat. The change is of little consequence, but is not discountable. For purposes of Section 7 under the Endangered Species Act, the

determination of effect would be *may affect, but is not likely to adversely affect* listed species or their habitat.

Moderate – a change to a population or individuals of a species or to designated critical habitat. The change is measurable and of consequence, but localized. The change is not expected to threaten the continued existence of the listed species within the Park. For purposes of Section 7 under the Endangered Species Act, the determination of effect would either be *may affect, but is not likely to adversely affect* listed species or their habitat or *may affect, likely to adversely affect* listed species or their habitat.

Major – a measurable and large and/or widespread change to a population or individuals of a species or to designated critical habitat. The change could threaten the continued existence of the species in the Park. For purposes of Section 7 under the Endangered Species Act, the determination of effect would be *may affect, likely to adversely affect* listed species or their habitat.

Mexican Spotted Owl

Alternative A

Direct/Indirect Effects

Continued use of the firing ranges without implementation of the proposals to clean up lead, make range improvements or construction of a new bullet-catching system would not result in changes to MSO occurrence or the potential for habitat use in the project vicinities. Ongoing activities at the North Rim firing ranges result in occasional and sporadic use by park rangers for practice and routine qualifications. This use is short-term and sporadic and likely results in noise disturbance from shooting to surrounding areas. Impacts of this routine use on MSO's are considered minimal due to the fact that the nearest MSO PAC to the North Rim range is greater than 2 miles away and the nearest MSO PAC to the South Rim range is greater than 1 mile away. The quality of habitat for MSO's surrounding each of the ranges is not optimal. These local, adverse, short-term impacts are negligible because no roosting or nesting habitat is present in the vicinity of the firing ranges and direct disturbance of potential foraging habitat would not result from continued use of the ranges. No vegetation manipulation or construction activities are proposed under Alternative A, and no new sources of disturbance would be introduced. Alternative A would therefore have only negligible impacts to MSO.

Cumulative Impacts

Past and present development on the North Rim has affected potential foraging habitat for MSO in the developed areas of the North Rim. This impact is minimized by the fact that MSO are not known to roost or nest on the plateau areas of the North Rim. No future activities are planned within the Park that would modify spotted owl critical habitat. Foreseeable future projects (Appendix B) in the vicinity of the project area could modify potential foraging habitat and result in increased disturbance during construction. However, this additional modification of foraging habitat is unlikely to affect the spotted owl because foraging habitat in affected areas is of marginal quality as the result of the high level of existing development, roads, and human use. Any disturbances to MSO from noise associated with construction activities for this project or any foreseeable future projects would be minimized by the implementation of mitigation measures jointly developed with the U. S. Fish and Wildlife Service. The cumulative effects of any the no action alternative, in combination with other past, present, and reasonably foreseeable

future actions, on spotted owls in the project vicinity would be negligible to minor, adverse, local, and long-term.

Impairment
Direct, indirect, and cumulative impacts to MSO's would be negligible as a result of implementing the no action alternative. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wildlife resources or park values.

Effects Common to All Action Alternatives

Direct/Indirect Effects
None of the action alternatives would result in modification of MSO habitat. Minimal vegetation manipulation would occur within the ranges to implement the proposals, since the ranges are already disturbed sites with very little vegetation. Therefore, the action alternatives would not result in any impacts to nesting, roosting or foraging habitat. Spotted owls are unlikely to be affected by noise associated with construction activities at the firing ranges because the nearest known PAC to the North Rim range is more than 2 miles from the project site and the nearest known PAC to the South Rim range is more than 1 mile from the project site. The South Rim firing range occurs in ponderosa pine habitat and is not considered MSO habitat. The North Rim range occurs in mixed conifer habitat that is MSO habitat. This habitat has been surveyed, however and no owls have been detected. Therefore, any action alternative would have a negligible to minor, local, long-term, adverse impact to MSO. For purposes of Section 7 of the Endangered Species Act, implementation of any of the action alternatives may affect, but is not likely to adversely affect MSO.

Cumulative Impacts
Due to the limited scope of this project and the fact that ground disturbance would occur in areas previously disturbed, combining this project with other past and reasonably foreseeable future projects (Appendix B) would result in only minimal cumulative impacts. As documented in previous Environmental Assessments for North Rim projects (NPS 2003) and South Rim projects (NPS 2002) where cumulative impacts using a watershed analysis were conducted, past and present development in these areas has affected potential foraging habitat for MSO's. This habitat alteration is unlikely to affect spotted owls on the North Rim because MSO are not known to use areas on the plateau. The Outlet Fire on the North Rim affected potential foraging habitat as well. The intensity of the fire varied, and the rate of vegetation recovery within the fire perimeter also varies. Because burned areas will recover, the effect of the fire is not considered a net loss of habitat. Prescribed burning has been conducted on the North and South Rims in the vicinity of the firing ranges and the developed areas of the rims, and more is planned in the next five years. Prescribed fires are unlikely to affect MSO because none of these prescribed burn areas are in habitat that is known to be used by spotted owls, and low-intensity fires are not known to affect spotted owl presence or reproduction (Jenness 2000). One proposed future project on the North Rim and a subset of another proposed project are proposed to occur in MSO critical habitat and are currently being consulted on separately with the FWS for potential impacts to MSO.

No other future activities are planned within the Park that would modify spotted owl critical habitat. Foreseeable future developments in the vicinity of the North and South rim ranges could modify potential foraging habitat and result in increased disturbance during construction. However, this additional modification of foraging habitat is unlikely to affect the spotted owl because foraging habitat in affected areas is of marginal quality as the result of the high level of existing development, roads, and human use. Any disturbances to MSO from noise associated with construction activities for this project or any foreseeable future projects would be minimized by mitigation measures such as those specified earlier in this document. The cumulative effects of any action alternative, in combination with other past, present, and reasonably foreseeable future actions, on spotted owls would be negligible to minor, adverse, local, and long-term.

Impairment
Direct, indirect, and cumulative impacts to MSO's would be negligible as a result of implementing any of the action alternatives. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wildlife resources or park values.

Conclusion
The No-Action Alternative would not result in any additional disturbance to Mexican spotted owls or removal of MSO habitat. Alternative B, C and D would not result in the modification of MSO habitat. Although habitat surrounding the North Rim firing range is mixed conifer habitat, it has been surveyed and no MSO have been detected in this area. The nearest known MSO PACs are greater than 1 mile from either firing range. Due to the similarities in level of ground disturbance and scope of the project under all alternatives, effects from implementation of any of the action alternatives would be negligible to minor, local, adverse, and long-term. Cumulative impacts to MSO under any alternative would be negligible to minor, adverse, local, and long-term. For purposes of Section 7 consultation under the Endangered Species Act, implementation of any of the action alternatives may affect, but are not likely to adversely affect Mexican spotted owls or their habitat.

California Condor

Alternative A – No Action
Direct/Indirect Effects
Continued use of the firing ranges without implementation of the proposals to clean up lead, make range improvements or construct a new bullet-catching system would not result in changes to condor occurrence or the potential for habitat use in the project vicinities. Ongoing activities at the North Rim firing ranges result in occasional and sporadic use by park rangers for practice and routine qualifications. This use is short-term and sporadic, and shooting likely results in noise disturbance to surrounding areas. Impacts on condors of this routine use are considered minimal due to the fact that there are no known condor breeding areas in the vicinity of either of the project areas; however, human presence creates the possibility for condor/human interactions.

Condors are monitored daily via radio telemetry, and any condors that land in the developed areas at the North or South Rims or within the firing ranges would be hazed by permitted Park employees to ensure condors do not become habituated to humans. Current Park policies and activities would be continued under Alternative A.

As discussed in detail earlier in this document, lead is concentrated in the soil comprising the backstop berms at each of the firing ranges, due to continued use of these areas as firing ranges for many years. Lead from bullets and brass bullet casings are in the soil and at the surface of the soil at each range. While lead in this form in the soil or sitting on top of the ground is not considered an environmental hazard, it does have the potential to be hazardous to wildlife, particularly condors. The likelihood of a condor picking up a lead fragment or copper from a casing from one of the ranges and ingesting it is high, especially if they are feeding or roosting in the area. They have a naturally curious nature and a tendency to frequent areas of human habitation. A very real threat to condors is lead poisoning from ingestion of lead shot in animal carcasses, and this has been the confirmed cause of illness or death in some recently released condors. It is assumed that the lead poisoning was a result of condors ingesting carrion containing lead bullet fragments (California Condor 2003). Implementation of Alternative A would result in lead fragments remaining in the soil at each range, and the risk to condors, while small, would continue. Therefore, the No-Action Alternative may result in minor to moderate long-term local adverse impacts to California condors.

Cumulative Impacts
Ongoing activities at both the North and South Rims create year-round disturbance in the project vicinity and provide the potential for condor/human interactions. Foreseeable future developments (Appendix B) would be primarily restricted to existing developed areas and would not increase the long-term likelihood of condor/human interactions. Construction activities associated with the action alternatives and any future developments may attract condors. Mitigation measures, developed jointly with the U.S. Fish and Wildlife Service, would be implemented to reduce the potential for detrimental interactions between condors and humans for any foreseeable future actions. Continued use of the firing ranges, as discussed above, could result in detrimental impacts to condors as a result of lead accumulations in the soils at both ranges. Other foreseeable future projects in the area, as listed in Appendix B, would not contribute to this risk and risks to condors as a result of these future projects are primarily limited to condor/human interaction during construction. Therefore, the cumulative effects of the no action alternative, in combination with other past, present, and reasonably foreseeable future actions, on condors would be negligible to minor, short- and long-term, local, and adverse.

Impairment
Direct, indirect, and cumulative impacts to California condors would be minor to moderate as a result of implementing the no action alternative. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wildlife resources or park values.

Effects Common to All Action Alternatives

Direct/Indirect Effects
The action alternatives would not result in any impacts to nesting or roosting habitat for the California condor because all such habitat occurs below the rim. No vegetation manipulation would occur below the rim, and no activities related to increasing visitor use of the area below the rim are proposed. Foraging habitat would not be affected because these alternatives would not change the availability of food sources for condors.

The action alternatives could affect California condors through increased contact with humans during construction. Condors may be attracted by construction activities, and condor contact with humans would be of concern if the birds are harassed or become habituated to humans. Mitigation measures to cease construction activities if condors are present would reduce disturbance from construction activities on the birds. Hazing by permitted Park employees would ensure condors do not become habituated to humans. Because all activities proposed under the action alternatives would occur within the existing confines of the ranges, they should not have any long-term effects on the potential for interactions between condors and humans. Therefore, any adverse impacts to condors would be short-term, local, and negligible.

The action alternatives propose to clean up the areas of highest concentration of lead at each range and construct a bullet-catching system that would keep lead from being deposited in the soil. While this action would not entirely eliminate lead fragments in the soil it would measurably reduce the level of lead at these sites and would appreciably reduce the potential for condors to find and ingest this lead. For this reason, beneficial impacts to condors would result and would be long-term, local and minor to moderate. Because condors are attracted to human activity and may be attracted to the firing ranges during project implementation (more so than at other times of the year) the potential for condors to find and potentially ingest lead at the site would increase during project implementation. Protective measures listed at the end of Chapter 2 to haze condors that frequent the project areas would minimize this potential, but construction workers and contract inspectors would need to have increased awareness of this potential risk.

Cumulative Impacts
Ongoing activities at the North and South rims create year-round disturbance in the project vicinities and provide the potential for condor/human interactions. Foreseeable future developments (Appendix B) would primarily occur in existing developed areas and would not increase the long-term likelihood of condor/human interactions. Construction activities associated with the action alternatives and any future developments may attract condors. Mitigation measures, such as those included in this document, would reduce the potential for detrimental interactions between condors and humans for any of the action alternatives as well as any foreseeable future actions. The cumulative adverse effects of any action alternative, in combination with other past, present, and reasonably foreseeable future actions, on condors would be negligible, short- and long-term and local. Minor to moderate beneficial impacts are also expected as a result of the removal of soils with the highest concentrations of lead and the construction of a bullet-catching system that would minimize the deposition of lead in the soil in the future.

Impairment
Direct, indirect, and cumulative impacts to California condors would be negligible to moderate as a result of implementing any of the action alternatives. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose

conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wildlife resources or park values.

Conclusion
The No-Action Alternative would not change the existing use of the firing ranges nor would it impact habitat for condors; however, the concentrations of lead in the soil at each range would remain and would not be cleaned up. This would result in minor to moderate long-term local adverse impacts to California condors. Any of the action alternatives could have adverse, negligible to minor, local, short-term impacts to condors during construction activities, but would result in minor to moderate beneficial impacts due to the cleanup of lead at each range and the implementation of a bullet-catching system. For purposes of Section 7 of the Endangered Species Act, Alternatives B, C or D may affect, but are not likely to adversely affect, the California condor. Cumulative adverse impacts under any alternative would be negligible to minor, short- and long-term, and local.

PARK OPERATIONS

Affected Environment
Park operations refer to the adequacy of staffing levels and the quality and effectiveness of the park infrastructure in protecting and preserving vital resources and providing for an effective visitor experience. Infrastructure facilities include roads used to provide access to and within the park; housing for staff required to work and live in the park; visitor orientation facilities; administrative buildings, management support facilities (garages, shops, storage buildings, and yards used for storage); and utilities such as phones, sewer, water, and electric. At the Grand Canyon National Park, firing ranges are considered small-arms ranges (which includes the occasional use of shotgun and rifle), and are used exclusively by the Law Enforcement Branch of the National Park Service to practice and qualify commissioned rangers. A variety of caliber handguns are used. Ammunition in use is lead encased in copper and lead shot. Firing ranges were created at both the North Rim and South Rim because it was not practical or effective to have distant off-site practice areas for law enforcement staff. There are two general aspects of park operations that appear to be pertinent to the rehabilitation of the firing ranges: ability to protect and preserve resources, and existing and needed facilities. Protection of resources, such as soil and water and wildlife, has already been discussed in this chapter. Facilities do not currently meet modern standards for firing ranges. Long-term maintenance of a bullet-catching system is another aspect of park operations. An efficient, easy-to-clean, bullet backstop would require less maintenance and fewer disturbances with heavy equipment, as well as fewer personnel to perform these tasks.

Environmental Consequences
Impacts to park operations focus on (1) employee and visitor health and safety; (2) ability to protect and preserve resources; (3) staff size, whether staffing needs to be increased or decreased; (4) existing and needed facilities; (5) communication (e.g., telephones, radio, computers, etc.);

and (6) appropriate utilities (sewer, electric, water). Definitions for levels of impacts to park operations efficiency are as follows:

Negligible – Park operations would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on park operations.

Minor – The effect would be detectable and likely short-term, but would be of a magnitude that would not have an appreciable effect on GRCA operations. If mitigation was needed to offset adverse effects, it would be simple and likely successful.

Moderate – The effects would be readily apparent, likely be long-term, and would result in a substantial change in park operations in a manner noticeable to staff and the public. Mitigation measures would be necessary to offset adverse effects and would likely be successful.

Major – The effects would be readily apparent long-term, and would result in a substantial change in park operation in a manner noticeable to staff and public and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, would be extensive and their success could not be guaranteed.

Alternative A – No Action

Direct/Indirect Effects. Under the No-Action Alternative, existing conditions at both firing ranges would remain the same. Indirect impacts would include the increased maintenance required as the existing buildings age and deteriorate. Also, as lead continues to accumulate in the soil within the two ranges, there would be increased maintenance and clean-up costs in the future, should the decision be made to close the ranges. These impacts would be moderate in intensity, local, long-term, and adverse.

Cumulative Impacts

All of the foreseeable future actions (Appendix B) are designed to have long-term, beneficial impacts on park operations through upgrades to existing facilities, including structures and firing lanes. Under the no-action alternative, maintenance requirements could increase at the firing ranges. Combined with all of the other foreseeable actions, these impacts would be local, adverse, and minor to moderate.

Effects Common to All Action Alternatives

Direct/Indirect Effects

This project is designed to improve the operation of the firing ranges in the park. Direct effects include implementation of a bullet containment system that would enhance safety and efficiency at both ranges, provide facilities that meet modern standards for shooting ranges, and would not require costly and extensive clean-up efforts if and when the ranges are closed at some point in the future. Any of the action alternatives would result in moderate, long-term, local, and beneficial effects on park operations. Specific differences between the three bullet-catching systems that could impact park operations are described below.

- **Alternative B – Shredded Rubber Backstop**
  Alternative B allows for the lowest amount of maintenance between the three alternatives, and thus the lowest impact to park operations. Also, there are no seasonal limitations with this system. Park staff would be able to train and qualify year-round.

- **Alternative C – Rubber Blocks**
  This system requires partial media replacement every 2-3 years. Regular maintenance is required, but there would be no seasonal limitations with this system. Park staff would be able to train and qualify year-round.
- **Alternative D – Engineered Sand Berm**
  With this alternative, berms must be sifted and supplemented every 2 to 3 years. The berm could saturate and erode. Use of this system is seasonally limited and could effect the ability of law enforcement staff to train in inclement weather.

Cumulative Impacts
All of the foreseeable future actions (Appendix B) are designed to have long-term, beneficial impacts on park operations through upgrades to existing facilities, including structures and firing lanes. These impacts would be local and moderate. Construction activities could have short-term, adverse impacts through disruptions in traffic patterns and utility services. Combined with past, present and foreseeable future projects at GRCA, these impacts would be minor to moderate.

Conclusions
The No-Action alternative would result in moderate, local, long-term, adverse effects on park operations, while any of the action alternatives would have moderate, long-term, local, beneficial effects on park operations. Cumulative impacts on park operations would be long-term, beneficial, local, and moderate, and adverse, short-term, local, and minor to moderate.

CHAPTER 4 – LIST OF PREPARERS

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CHAPTER 5 – CONSULTATION WITH OTHERS

Arizona Game and Fish Department
NPS staff met with personnel from AGFD on 13 December 2000 to discuss this project proposal and other future proposals. A list of species of concern for the North Rim and South Rim was discussed at this meeting.

U.S. Fish and Wildlife Service
NPS staff met with personnel from USFWS on 13 December 2000 to discuss this project proposal and other future proposals. A list of species of concern for the South Rim was discussed at this meeting. Detailed discussions between NPS staff and USFWS personnel also occurred during the preparation of the batch consultation for construction projects in the park during March – June 2002. This project and many other construction projects in the park were discussed. The Fish and Wildlife Service concurred with the park's determination that implementation of the Rehabilitation of the South Rim and North Firing Ranges, as one of 61 construction projects occurring over the next five years, may affect, but is not likely to adversely affect the Mexican spotted owl or the California condor. Concurrence was received on July 9, 2002.

State Historic Preservation Office
An informational letter describing the scope of the project was sent to the Arizona State Historic Preservation Office in November 2002. They have requested to review the environmental assessment/assessment of effects when it is completed.

Tribal Groups
The NPS sent scoping letters on 20 February 2003 to eight tribal groups. Although nine tribal groups have interests in the Park, only eight ask to be consulted on projects outside the river corridor. No responses were received.

Public Involvement
The firing range rehabilitation proposal was included in a public scoping letter that was submitted to a 300-person Grand Canyon National Park mailing list on February 20, 2003. This letter was also posted on the park's web site. The purpose of the scoping letter was to describe the proposed action to any interested/affected parties and solicit comments from those who may have issues with the proposed action. From these public scoping activities, four responses were received that pertained specifically to this project. Two of these letters were from private citizens in California and Arizona. The letters generally supported the project. One respondent wanted to know why we needed to have firing ranges within park boundaries. This issue was discussed in the EA. Another letter of support was received from Kenneth Edes, Mayor of the City of Williams. A fourth letter of support was received from a retired Arizona Game and Fish Wildlife Manager, Jim Higgs, who is currently the director of Backcountry Horsemen Central Arizona. Copies of the final EA will be sent to all four of these respondents.

Proposed Distribution List for the Firing Ranges EA

Arizona Department of Environmental Quality
Arizona Game and Fish Department
- John Kennedy, Habitat Branch
- Rick Miller, Habitat Program Manager
- Ron Sieg, Regional Supervisor

Coconino National Forest Headquarters, Flagstaff
Coconino County
Flagstaff City Government
Grand Canyon Association
Grand Canyon National Park Foundation
Interested Public
Libraries
- Flagstaff Public Library, Reference Department
- Grand Canyon Community Library, Librarian
- NAU, Cline Library
- Page Public Library, Reference Department
- Sedona Public Library, Reference Department

Tribal Groups (8)
State Historic Preservation Office, Arizona State Parks
U.S. Fish and Wildlife Service

SELECTED REFERENCES

Executive Orders
Executive Order 11988 (Floodplain Management)
Executive Order 12898 (Environmental Justice)
Executive Order 13186 (Migratory Birds)

NPS Director's Orders

DO-2	Planning Process Guidelines
DO-12	Conservation Planning, Environmental Impact Analysis and Decision Making
DO-28	Cultural Resource Management
DO-47	Sound Preservation and Noise Management
DO-65	Explosives Use and Blasting Safety
NPS-77	Natural Resources Management Guideline
DO-77-1	Wetland Protection
DO-13	Environmental Leadership (DRAFT)

US Federal Government and State Government
36 CFR 800.11

40 CFR, Part 503

1864 Act of Congress (13 Stat. 325)

1890 Act of Congress (26 Stat. 650)

1906 Joint Resolution of Congress (34 Stat. 831)

1955 Federal Air Quality Law

1963 Clean Air Act, as amended

1964 Wilderness Act

1966 National Historic Preservation Act

1969 National Environmental Policy Act (NEPA)

1973 Endangered Species Act, as amended

1976 Resource Conservation and Recovery Act. 42 U.S.C. s/s 6901 et seq.

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APPENDIX A

Compliance

The following laws and associated regulations provided direction for the design of project alternatives, the analysis of impacts and the formulation of mitigation or avoidance measures:

National Environmental Policy Act of 1969 (NEPA) (Title 42 U.S. Code Sections 4321 to 4370 [42 USC 4321-4370]). The purposes of NEPA include encouraging "harmony between [humans] and their environment and promote efforts which will prevent or eliminate damage to the environment and stimulate the health and welfare of [humanity]". The purposes of NEPA are accomplished by evaluating the effects of federal actions. The results of these evaluations are presented to the public, federal agencies and public officials in document format (e.g., environmental assessments and environmental impact statements) for consideration prior to taking official action or making official decisions. Implementing regulations for the NEPA are contained in Part 1500 to 1515 of Title 40 of the U.S. Code of Federal Regulations (40 CFR 1500-1515).

Clean Water Act of 1972, as amended (CWA) (33 USC 1251-1387). The purposes of the CWA are to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters". To enact this goal, the U.S. Army Corps of Engineers (Corps) has been charged with evaluating federal actions that result in potential degradation of waters of the U.S. and issuing permits for actions consistent with the CWA. The U.S. Environmental Protection Agency also has responsibility for oversight and review of permits and actions, which affect waters of the U.S. Implementing regulations describing the Corps' CWA program are contained in 33 CFR 320-330.

Clean Air Act (PL chapter 360, 69 Stat 322, 42 USC 7401 et seq.). The main purpose of this act is to protect and enhance the nation's air quality to promote the public health and welfare. The act establishes specific programs that provide special protection for air resources and air quality related values associated with NPS units. The U.S. Environmental Protection Agency has been charged with implementing this Act.

Endangered Species Act of 1973, as amended (ESA) (16 USC 1531-1544). The purposes of the ESA include providing "a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved". According to the ESA, "all Federal departments and agencies shall seek to conserve endangered species and threatened species" and "[e]ach Federal agency shall…insure that any action authorized, funded, or carried out by such agency…is not likely to jeopardize the continued existence of any endangered species or threatened species". The U.S. Fish and Wildlife Service (non-marine species) and the National Marine Fisheries Service (marine species, including anadromous fish and marine mammals) administer the ESA. The effects of any agency action that may affect endangered, threatened, or proposed species must be evaluated in consultation with either the USFWS or NMFS, as appropriate. Implementing regulations which describe procedures for interagency cooperation to determine the effects of actions on endangered, threatened, or proposed species are contained in 50 CFR 402.

National Historic Preservation Act of 1966, as amended (NHPA) (16 USC 470 *et sequentia*). Congressional policy set forth in the NHPA includes preserving "the historical and cultural foundations of the Nation" and preserving irreplaceable examples important to our national heritage to maintain "cultural, educational, aesthetic, inspirational, economic, and energy benefits". The NHPA also established the National Register of Historic Places composed of "districts, sites,

buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture". The NHPA requires that federal agencies take into account the effects of their actions on properties eligible for or included in the National Register of Historic Places and coordinate such actions with State Historic Preservation Offices (SHPO). NHPA also requires federal agencies, in consultation with the SHPO, to locate, inventory, and nominate all properties that appear to qualify for the National Register of Historic Places, including National Historic Landmarks. Further, it requires federal agencies to document those properties in the case of an adverse effect and propose alternatives to those actions, in accordance with the NEPA.

Appendix B - Foreseeable Future Actions
South Rim and North Rim Firing Range Rehabilitation

South Rim

Foreseeable future actions were considered to be actions that could occur in the vicinity of Grand Canyon Village within the next five years which currently have funding or funding is actively being sought. Below are brief descriptions of foreseeable future actions that were considered during the cumulative impact analysis.

Horace Albright Training Center. The Horace Albright Training Center would be rehabilitated to better accommodate current training demands and modernize the facility to meet current NPS construction standards. Rehabilitation activities would include landscaping the grounds with native plants; replacement of deteriorated concrete walkways; resurfacing of entrance road and parking areas; replacement of water and sewer lines; remodeling the interiors of five eleven-unit apartment buildings; remodeling of Kowski Hall; construction of an addition to Kowski Hall; and the construction of a storage building at the northern end of Kowski Hall. The planning and environmental documentation for this project is nearly complete. Implementation is expected to occur within the next year.

Potential Mass Transit Options. Mass transit options for the park are currently being explored and include both light rail and bus options, or a combination of both. A transportation system may be developed from Tusayan to Mather Point and could include locations parallel to South Entrance Road. The planning and environmental documentation for this project is on-going. Implementation may occur within the five years.

NPS Maintenance Facility. A new NPS maintenance facility is currently being constructed near the shuttle bus compound and helibase complex. This facility will consist of offices, warehouse, vehicle maintenance building, storage buildings, and a boat shop. The planning and environmental documentation for this project is completed.

Mule Barn. A new mule barn may be constructed along Rowe Well Road. The planning for this project is currently ongoing. Implementation may occur within the next five years.

Greenway. A paved pedestrian and bike path of about 0.6 kilometers (1 mile) has been constructed from the new Canyon View Information Plaza (CVIP) to Park Headquarters. Another segment of Greenway trail, from CVIP to Tusayan, is currently in the planning and compliance phases. Other segments of trail on the south rim are also being explored. All Greenway trail proposals would include the installation of lighting, signs, and benches. This pathway would be part of a larger Greenway system that would eventually link all major areas of the South Rim. Planning for this project is currently ongoing.

Emergency Services Facility. This project proposes to construct a new emergency services building to house emergency medical services, structural fire protection, and search and rescue operations. This preferred location for this facility is the Clinic building. This proposal would include the construction of a parking area and access road in addition to a new building. Planning for this project is currently ongoing. Implementation may occur within the next five years

Non-government Housing. Additional housing may be constructed near the Albright Training Center. The planning for this project is currently ongoing. Implementation may occur within the next five years.

Grand Canyon Village Restrooms. Construction or rehabilitation of restroom facilities may occur throughout the South Rim, including locations at Yavapai Observation Station and Bright Angel Trailhead in Grand Canyon Village. This would occur as part of a park-wide restroom restoration effort. Planning for this project is currently underway. Implementation would occur within the next five years

Walkways. Pedestrian walkways may be resurfaced to improve safety and universal accessibility. Walkways that would be improved include walkways around the General Store, Shrine of the Ages, and between Verkamp's store and Kolb Studio along the South Rim. Walkways within Mather Campground may also be addressed under this effort. Planning for this project is currently underway. Implementation would occur within the next five years. Ground disturbance for this project would generally be on existing trails and walks, but some new ground disturbance may be necessary.

Mather Campground Rehabilitation. Mather Campground would be rehabilitated. The purpose of the proposal is to provide universal accessibility and a high quality visitor experience within Mather Campground. This would be achieved through the improvement of accessible campsites, upgrading restroom facilities, redesign of the entrance area, and relocation of campsites that are close to South Entrance Road and potential transit corridors. Construction is expected in summer and fall of 2003.

Heritage Education Campus (HEC). One National Landmark structure and four other National Register buildings near the powerhouse area of the historic district may be converted to interpretive and classroom space for the Heritage Education Campus. This would entail relocation of functions currently utilizing these buildings and renovation. Planning for this project has begun. Implementation of some of the first phases of this project would likely occur within the next five years. The HEC would utilize an area within the Village that is already developed with parking areas and buildings.

Yavapai Observation Station. Currently the Yavapai Observation Station is utilized as a bookstore. This building would be rehabilitated, including returning it to its original use, which was a geological interpretative facility. Rehabilitation would include interior and exterior repairs. Planning is currently underway for this project and implementation is expected in fall of 2003.

Park Headquarters/Visitor Center. The Canyon View Information Plaza has replaced the visitor center function that used to occur at the park headquarters/visitor center building. This project would convert the extra space vacated by the visitor center function to administrative space, and would include additions to the building. Rehabilitation of the entire building would also occur with this project. This would include upgrading the heating and cooling systems, doors, windows, insulation, roofing, electrical, data communications, and mechanical systems. The rehabilitation would also include the installation of a fire sprinkler system and rehabilitation of the exterior to a historically accurate finish. Planning is currently underway for this project. Implementation may occur within the next five years.

North Rim

Foreseeable future actions were considered to be actions that could occur in the developed area of the North Rim within the next five years, which currently have funding or for which funding is

being actively sought. Below are brief descriptions of foreseeable future actions that were considered during the cumulative impact analysis.

North Rim Administrative Building – This project would remove the existing administration building (a modular) and construct a larger building at essentially the same site, would renovate the existing parking area and continue to use the existing roads for access to the new building. The new building would be approximately 2,467 square feet and would support the backcountry permit system, visitor contact services, public restroom, and administrative offices. Very little tree removal, if any, would be required for this project, due to its location on the existing footprint of the current building and its associated parking area. The project area is relatively small, is between two residential areas and within the headquarters area where development has occurred and continues to occur.

N*orth Rim Emergency Services/Wildland Fire Facility* – A new emergency services/wildland fire facility would be built in the vicinity of the water tanks. The facility would occupy approximately 984 square m (10,590 square feet) and would have EMS facilities grouped at one end of the building, wildland fire facilities at the other, and shared spaces between. EMS facilities would include storage areas for emergency services vehicles (fire engine, ambulance, patrol cars, suburban), caches for EMS and search and rescue equipment, men's and women's locker rooms, holding cells, and office space. The wildland fire facilities would include storage areas for vehicles, a fire equipment cache, and office, laboratory, and work spaces. Shared facilities would include offices, a conference room, and maintenance facilities. Parking at the facility for staff and visitors would accommodate approximately 15 vehicles. Paved area for parking and roads would occupy approximately 0.4 ha (0.9 acre).

Exposed Frame Cabin Rehabilitation, Restoration, and Reconstruction –Twenty-six one-room cabins, a shower facility, and a laundry facility in the North Rim Inn and Campground Historic District would be restored, rehabilitated, or reconstructed and would be used to house the wildland fire crew. Project actions will be limited to the buildings themselves and the immediate surroundings and would not require ground disturbance or vegetation removal.

North Rim Campground Rehabilitation – This project includes removal of the existing entrance kiosk and constructing a new campground registration building essentially within the existing parking area, resurfacing the roads within the campground, restroom rehabilitation, installation of a 6-stall restroom and one prefabricated vault toilet at the group site to replace the existing outhouse.

North Rim Lodge Road Reconfiguration – This project would change public access routes to the Lodge. The terminus of the main road would be reconfigured to allow tour buses to turn around and discharge and pick up guests at this terminus, and to restrict passenger vehicle access to the Lodge. The existing road segment between the parking area and the Lodge would be converted primarily to pedestrian use. Very little new ground disturbance would result from this project, as most work is confined to existing roadways and parking areas

Lodge Road Parking – The main parking area would be reconfigured to allow for additional bus/RV parking.

Visitor Center Upgrades and Orientation Center Exhibits – Improper drainage beneath the visitor center would be repaired, the building exterior would be refinished, solar panels would be added to the roof, native vegetation landscaping would be added to the site, and repair and rehabilitation of the existing walkways around the building would be done. A wayside exhibit plan has been created by the park for the plaza area adjacent to the visitor center. Two orientation panels and three to

four interpretive panels would be installed as well as a flagpole. Low-level outdoor lighting may be installed as well, but the park is still evaluating the necessity and feasibility of this component. All work would occur in areas that receive high visitor use in the summer season and that are already developed. .

North Rim Water Distribution System Rehabilitation – This project involves upgrading the existing water distribution system, including the addition of fire hydrants and hose houses where necessary. The majority of the existing potable water lines would be dug up and replaced. A pumping station would be upgraded to boost pressure to the administrative area and the campground area. Work would be conducted in previously disturbed areas, along existing utility corridors, many of which are along roads. Tree removal would be minimal, consisting primarily of small seedlings and saplings that have grown up along the utility corridor. Approximately 2.3 miles of water line would be replaced during the course of this project

44-Room Dorm – A 44-unit, two-story dormitory would be constructed adjacent to the existing RV Trailer park and mill shed within the developed area of the North Rim on Bright Angel peninsula. This dorm would provide critically needed housing for concessioner employees on the North Rim. The dorm would be constructed adjacent to the RV park and in the vicinity of the concessioner dining facility and housing area. These areas are currently disturbed sites that are frequently used by concessions and park employees, and are not in areas accessed by the public. The habitat type in the project area is ponderosa pine, with some occasional aspen represented

Mill Shed Replacement – This is a small building that is in need of replacement. The project would take down the existing building. The current proposal would entail construction of a replacement building on the same site, pending cultural resource evaluation and consultation with the State Historic Preservation Officer. This project is located within the concessioner/maintenance and housing area, and adjacent to the site of the proposed concessioner dorm. Vegetation disturbance would be minimal and tree removal is unlikely. This area is a disturbed site that is frequently used by concessions and park employees, and is not in an area accessed by the public.

RV Trailer Park Upgrades – This project would add twelve additional RV sites to the North Rim employee trailer court and upgrade the existing infrastructure. Sites would be added within the boundaries of the existing trailer park, which is located within the concessioner/maintenance and housing area, and adjacent to the site of the proposed concessioner dorm. Vegetation disturbance would be minimal and tree removal is unlikely. This area is a disturbed site that is frequently used by concessions and park employees, and is not in an area accessed by the public

North Kaibab Trailhead Restroom –The existing portable toilet in the upper parking area island would be replaced with a pair of prefabricated vault toilets at the same location. It is likely some rock excavation may be necessary for vault installation. Site work would include removal and replacement of curbing, accessible walkway placement and installation of accessible ramps to the toilets. No trees would need to be removed for this project

Widforss Trailhead Restroom – No toilet exists at this location. A single prefabricated vault toilet would be constructed at the far end of the parking area in a disturbed area. It is likely some rock excavation may be necessary for vault installation. Site work would include some grading and drainage improvements, and construction of a small dry laid stone wall behind the building. No trees would need to be removed for this project. The project area is an existing parking area. This is a small project resulting in little ground disturbance and is expected to be of short duration (2-5 days for installation).

Arizona Trail – This project would construct a small segment of new trail between Forest Service Land and the park boundary to connect two existing segments of the Arizona Trail. New trail construction would be limited to approximately 2.4 km (1.5 miles) out of an approximately 17.7-km (11-mile) segment between the park boundary and existing roads and utility corridors. Some tree removal and ground disturbance would be necessary for the 2.4-km (1.5-mile) segment, near the entrance station.

North Rim Entrance Station Rehabilitation – This project is adjacent to but not within the Bright Angel peninsula subwatershed. This project would rehabilitate the historic entrance station and surrounding area. A specific proposal has not yet been developed fully. Actions that are likely to be included in the project are: reconfiguration of the road and parking area, replacing the entrance sign and gate, installation of visitor orientation signs, constructing a restroom, and rehabilitating the existing historic building, which includes upgrading the security and HVAC systems.

Repaving Cape Royal Road to Point Imperial Spur – This road maintenance project would include pulverizing existing asphalt and overlaying new asphalt. Work would total approximately 9.7 km (6 miles) of road. Widening of road will be required at some culvert locations where the road is narrower than elsewhere. Incidental improvements to guardrails and drainage will be needed. The surrounding habitat along some sections of this road is mixed conifer. Much of this area was burned in the Outlet Fire. Implementation of the project may include some vegetation disturbance where slight widening is necessary near culverts. It is unlikely this would require tree removal.

North Rim Development Plan – This planning effort is addressing options for improvements in visitor orientation and interpretation for the North Rim, to implement the park's General Management Plan. This plan is still in its initial stages, and specific project components have not been identified.

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Fire Sprinkler Systems in 13 North Rim Buildings – This project would add structural fire sprinkler systems to 13 buildings on the North Rim, equating to approximately 1,394 square m (15,000 square feet) of protected floor space. At this time, none of these buildings have sprinkler systems and need protection. Eight of the structures are listed on the National Register of Historic Places and all 13 are located within the administrative area of the North Rim developed zone. Structures to be sprinkled include 5 non-historic residences, 7 historic residences and 1 historic office building: the ranger operations office (building 119). Project actions would be limited to the buildings themselves and the immediate surroundings and would not require new ground disturbance or vegetation removal.